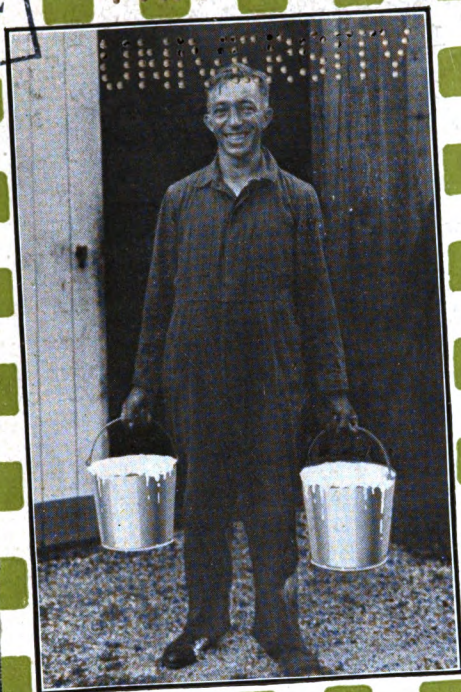


PRICE 35 CENTS



Kalston Purina company.

THE
PURINA COW
BOOK
A-B-C-OF MILK MAKING

Sent with the compliments of
W. A. RICE,
COLUMBUS, OHIO.

STATE OF OHIO

1922 *Purina* Cow Book

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R16

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Do You Know?

How many quarts of blood go through a cow's udder in a day?
See page 15.



What makes cream yellow?

See page 86.

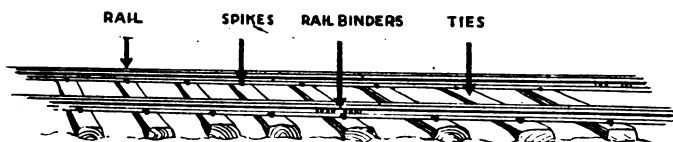
How much milk is there in a cow's udder just before milking. See page 15.



What is the proper concentrate to feed with silage and Clover Hay?

See page 28.

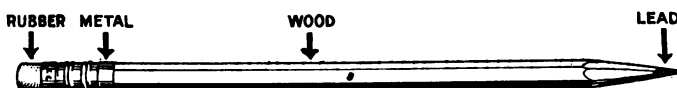
*This book is written for the practical cow owner—the man who wants to **KNOW** how to increase profits from dairying. It contains the answers to questions asked by hundreds of dairymen. You can read it in less than an hour. Read every page.*



Making Milk Is Like Building a Railroad

Making milk is like building a railroad. You must have ties, rails, spikes and rail binders. If anyone of these gives out, your railroad must stop at that point. You might have a slight reserve supply that you could draw on, but that would not last long.

Milk contains water, two kinds of protein, mineral matter, carbohydrates and fat. A cow will make milk as long as all of these are provided in her feed. When any element gives out she draws on the reserve supply in her system for a short time.



Making milk is like making lead pencils. You must have wood, leads, brass tips and rubber. You cannot make complete pencils without a supply of *each* material. If you give a cow lots of water, she does not give thin milk. If you fail to supply proteins in the proper form, she gives less milk. This is evident when summer advances and the grass dries out. The protein is cut down and the cow gives less milk, unless she gets protein from some grain feed.

The managers of a railroad or a lead pencil factory do not guess about the supplies needed for a given job. The dairyman cannot afford to guess about the elements needed to make milk.

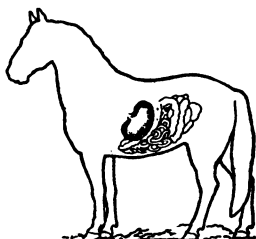
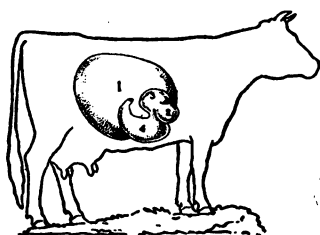
How a Cow Digests

The story of how a cow makes milk is intensely interesting. But in order to understand it thoroughly we must start at the beginning and study the cow and her peculiar digestive system. Look on the next page and see a diagram of the path the feed takes as it passes through the many stomachs and intestines of a cow's digestive tract.

Now, let's see what happens to feed that a cow eats.

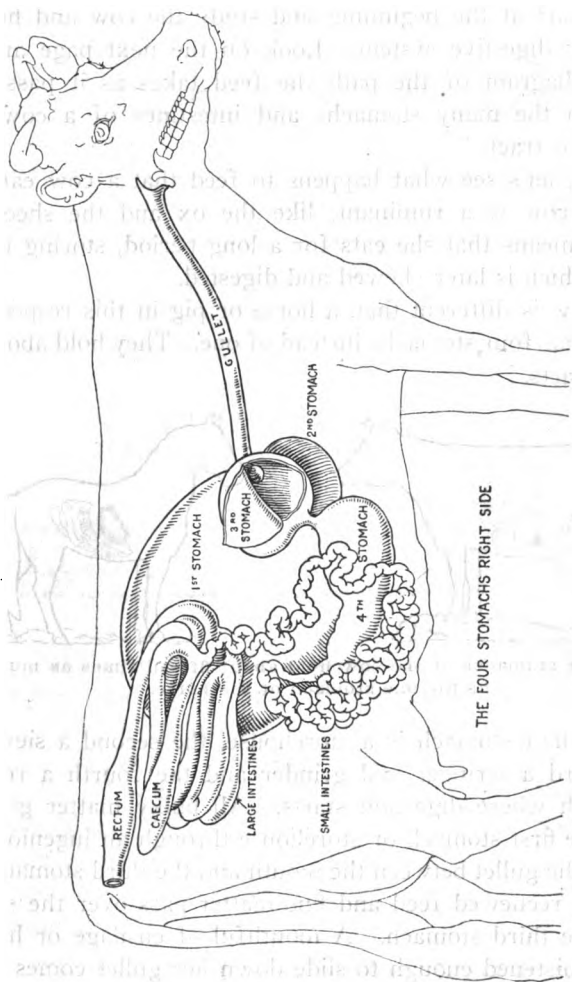
The cow is a ruminant, like the ox and the sheep, which means that she eats for a long period, storing up food which is later chewed and digested.

A cow is different than a horse or pig in this respect, as she has four stomachs instead of one. They hold about 260 quarts.



The four stomachs of the cow hold about fifteen times as much as the one stomach of the horse.

The first stomach is a storehouse, the second a sieve, the third a wringer and grinder and the fourth a real stomach where digestion starts. All bulky matter goes into the first stomach or storehouse through an ingenious slit in the gullet between the mouth and the third stomach. Water, rechewed feed and fine matter pass over the slit into the third stomach. A mouthful of ensilage or hay just moistened enough to slide down her gullet comes to this slit, and, being bulky, stretches the opening and drops into the first stomach. Water, being a fluid, conforms to the shape of the gullet and slides over the slit into



Showing the course feed takes in passing through the digestive tract of the cow. In order to show the digestive system more clearly, the intestines have been shown spread out more than they would actually appear in the cow. Note the size of the cow's four stomachs.

the third stomach. A large part of a heavy feed like cottonseed meal or linseed meal all by itself is very apt to go directly into the third stomach and not be dropped into the first stomach, where it should go. Heavy feeds should be avoided. The ideal ration is palatable and

bulky, so that the first stomach is filled full of feed that has to be chewed as cud.



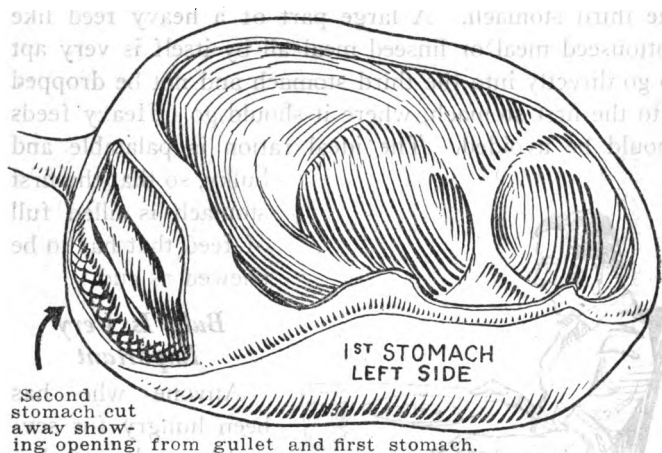
Bulk Is Very Important

Anyone who has been hungry for several hours knows that "empty stomach" feeling. Imagine how the cow must feel with four empty stomachs! She cannot handle her feed properly, or be nervously efficient, unless

these four stomachs are kept filled. You might provide all the protein and other nutrients needed for maintaining the system and making milk, but if the ration were not bulky you would have a discontented cow and less milk.

Bulky Feed Should Be Digestible

Bulk is provided largely by the fiber or woody part of a feed. If this fiber tastes good and is largely digestible, much better results are obtained. For instance, alfalfa meal makes a much better bulk than bran, its fiber being more digestible. It should be remembered that an enormous amount of energy is required for the digestion. The more energy that is used in trying to digest useless bulk, the less energy is available for making milk.



The Cud

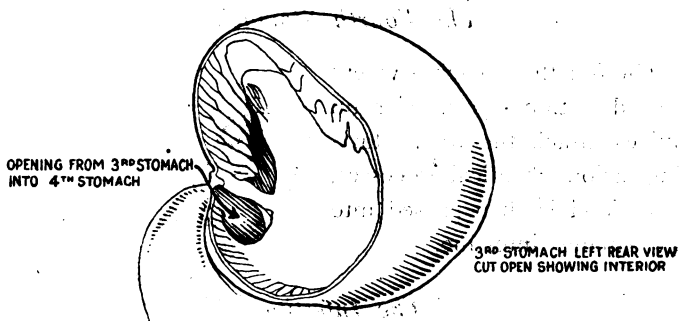
After a cow has finished eating, she begins to chew her cud. In other words, she throws up (regurgitates) her cud, which is really a portion of the feed lying in the first stomach. This feed returns to the mouth a few ounces at a time, is chewed very fine, mixed with saliva and then swallowed again. This time it is not a large bulky ball, but a small and slippery mass. It passes over the slit into the gullet and into the third stomach.

The Second Stomach

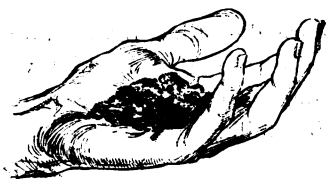
The term "second stomach" is a bit misleading. It is really a sort of annex to the first stomach, but with a very heavy lining. This lining is like a honeycomb, and catches and holds foreign material, such as stones and bits of wire. Tripe is another name for this lining. The second stomach also has muscles which help open the slit in the gullet and return food to the mouth, as a cud.

The Third Stomach

The third stomach presses out the water from the feed and helps grind it. A heavy feed is apt to pass directly to the third stomach and not receive the grinding that



occurs when a cow chews her cud. The second chewing the cow gives her feed is much more thorough than the first, makes the feed finer and mixes it thoroughly with saliva, which is a big aid to digestion.



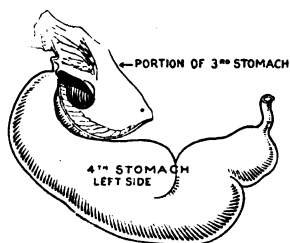
Try This Yourself

To see how Cow Chow looks in the third stomach, and the value of alfalfa as bulk, put a little Cow Chow in a tumbler of water. Squeeze the water out and then spread the damp Cow Chow on the palm of the hand. Note how the bulk expands and separates the concentrates so the digestive juices can do their full work. This is exactly what takes place in the third stomach when you feed Cow Chow.

Cottonseed hulls, oat hulls and similar by-products require a lot of digestive energy and produce poor results compared with a ration in which the bulk is made up as provided by alfalfa meal. See page 23, line 6.

The Fourth Stomach

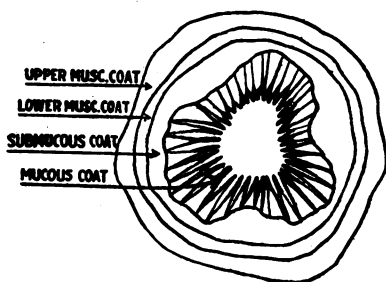
The fourth stomach is where real digestion starts. Certain juices attack the food, starting various chemical processes. The food is then passed into the smaller intestine.



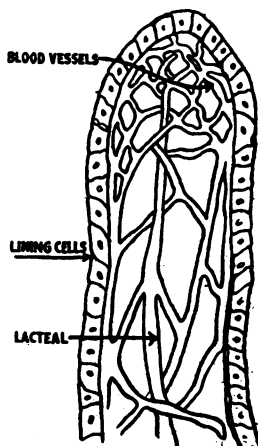
The Intestines

In the smaller intestine more digestive juices are poured onto the food from the liver, spleen and pancreas. Part of the food is absorbed through the walls of this intestine, into the blood, and carried over the body for various uses. Some of the food, however, is never digested and passes into the larger intestine to be finally expelled in the droppings.

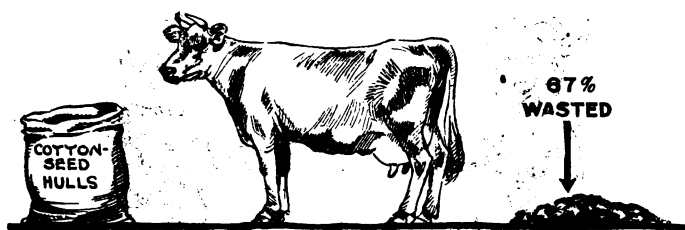
As some feeds are more digestible than others, care should be taken to buy only feeds that are highly digestible. They put less burden on the digestive system and furnish more material for milk.



Cross section of small intestine.



Cross section of Villia.



Warning—Digestibility

It is not what a cow eats but what she *digests* that counts. Wood contains a high percentage of carbohydrates, but a cow cannot digest it. Protein is found abundantly in tankage and other substances that are not suited to a dairy ration.

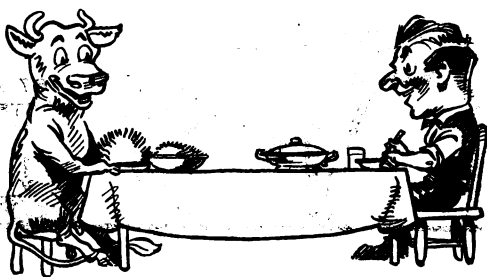
On the other hand, the fiber or woody substance of some plants, such as alfalfa, can be fairly well digested by the cow.

For instance, a cow will digest 75 pounds out of every 100 pounds of corn, but only 33 pounds out of 100 pounds of cottonseed hulls.

These figures also vary according to the different nutrients.

Of the protein in oat hulls, only 50 per cent. is digestible, while in linseed meal, cottonseed meal and gluten feed, 85 to 89 per cent. of the protein will be digested by the cow.

The crude analysis printed on bags and state tax tags may be misleading, as a cow can't read a tag and she digests her feed, not according to what the tag says, but according to the way her digestive juices work on it. All of the rations in this booklet are based on the digestible analysis of the feed. See page 23, line 2.



Palatability

The cow digests a palatable feed better than the one she doesn't relish, but more important still, the milk flow depends entirely on the quantity of feed eaten. The average cow needs about 16 lbs. of digestible nutrients a day to maintain her body and produce $3\frac{1}{2}$ gallons of milk: half for body maintenance and half for milk.

**8 Pounds
For Body**

**8 Pounds
For Milk**

If she doesn't like her feed and consumes only 12 lbs. of digestible nutrients, it cuts down her milk material ONE-HALF.

**8 Pounds
For Body**

**4 Pounds
For Milk**

This is because she must maintain her body, and it is the *excess* that goes into the milk pail, if properly balanced. A cow may draw from her body for a time, but it makes her dry up quicker and actually shortens her life.

When you sit down to a meal that you are very fond of, for instance, a big, thick, juicy, tender steak, you can feel your mouth water. All the digestive juices throughout the stomach and intestines also begin to flow. When that steak is eaten there are plenty of juices to digest it. If you dislike food, the digestive juices are held back. It's the same with the cow. Purina Cow Chow is palatable. See page 23, line 7.

Condition a Milk Factor

No man can do good work when he is feeling sick. A little indigestion makes one sleepy, makes one gap, and interferes with effective work.



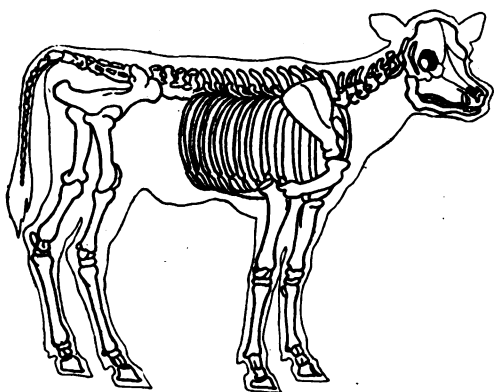
A cow or horse is just the same. When the skin gets hard and the hair dull, when it's easy to catch cold and be thrown off feed, there is something wrong with the condition and it shows up in the milk pail.

Condition is nearly entirely due to feed. All authorities agree that there should be variety in a dairy ration.

Tankage is very high in protein, but it would not be good for the dairy cow in large quantities because it isn't the kind of protein that milk requires. It is very important that the cow's ration be made from a large number of different plants, so as to get a variety of proteins, which means more milk.

Minnesota Bulletin No. 130 says:

"The ration should be composed of a reasonable number of feeds, since a mixture is relished better than any one kind of grain or roughage; but frequent changes in a ration should be avoided, as they cause imperfect digestion and assimilation. The dairyman should so adjust the supply of feed that the ration can be made from two kinds of roughage and several kinds of grain, and then make no more changes during the winter than are necessary. If an appetizing, well-balanced ration can be fed all winter, better results will be obtained than when changes in the ration are made. Succulent feed, such as roots and silage, is greatly relished, and it stimulates the appetite and the flow of milk. It also aids digestion by keeping the cow in better physical tone." (See page 23, line 5.)



Did You Ever See a Calf Without Bones?

Milk was originally made for the calf. Nature supplies the calf, through milk alone for the first few weeks with all the elements needed to supply bones, hair, hide flesh, blood, teeth, heat and energy.

The cow's milk is always perfectly balanced for the needs of the calf. You have never seen a calf without bones or hair, because nature won't make milk without the material they need. A cow can't put any element in the milk pail that she does not get in the feed or temporarily draw from her own system. Should you keep water from her, she would not give dry milk but less milk. Besides having good cows, the most vital point in successful dairying is to *know* what the cow needs and to supply it in the right form—palatable, easily digested, bulky and properly balanced.

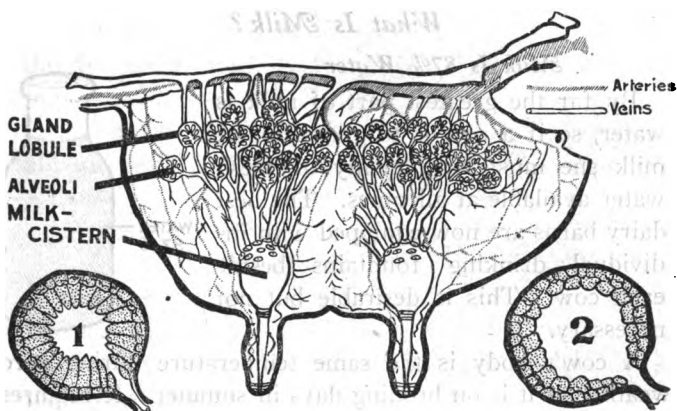
Your cow uses feed in three ways—

First, to maintain her body.

Second, to develop her offspring.

Third, to provide milk for her offspring.

If a cow's ration is not properly balanced she might draw on her own system for elements to balance. But not for long. She soon drops off in milk.



How Milk is Made

Milk is made from blood in the cow's udder. Internally the udder is divided into four quarters, each of which is supplied with an outlet or teat. The actual secretion takes place in the mammary glands. The glands are composed largely of blood vessels and epithelial cells. From the glands the milk comes down to the milk cisterns, which are located just above the teats.

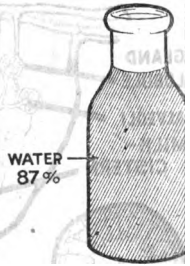
The milk producing power of an udder depends largely upon the amount of blood carried to and from it. It has been found that over 5,000 quarts of blood pass through the udder of a cow every 24 hours when the cow is giving from 20 to 25 pounds of milk a day. Milk is secreted from the blood while it passes through the smallest blood vessels in the udder, called capillaries, and from the lymph while it passes through the lymphatics.

Relatively little milk is in the udder previous to milking. The milk cisterns just above the teats and certain connecting tubes from the cellular tissue above are frequently full of milk. Different authorities agree that there is usually from one-half to one pint of milk in the udder just before milking. When the milking starts, milk is secreted rapidly. (See page 40.)

What Is Milk?

Milk Is 87% Water

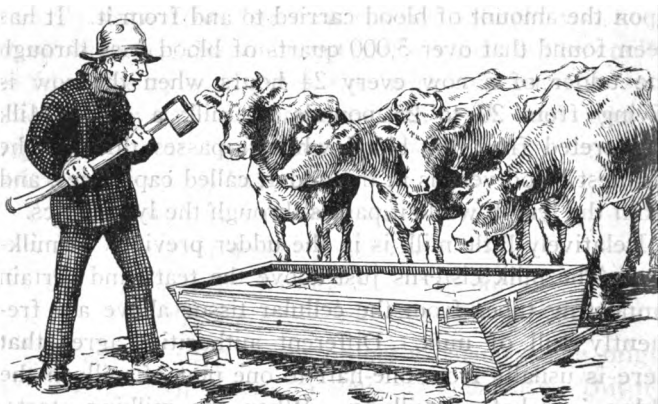
By far the greatest part of milk is water, so if a cow is to give a lot of milk she must have plenty of fresh water available at all times. The best dairy barns are now equipped with individual drinking fountains beside each cow. This is desirable but not necessary.



A cow's body is the same temperature during zero weather as it is on broiling days in summer. It requires a lot of energy to heat freezing water to 100 degrees, the temperature of the cow's body. It is a lot cheaper for you to temper the water in winter by use of a fire than by a cow's energy that should go to making milk.

Very often a slump in the winter milk yield is caused by cows being herded out twice a day into bitterly cold weather to drink from a hole in the ice.

Drinking troughs should be sanitary and supplied with fresh running water. The best results are obtained when cows can drink water whenever they like.



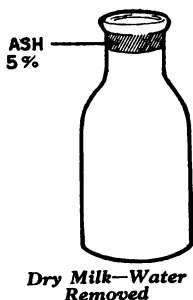
Under such conditions a cow never drinks as much as she needs for maximum milk production.

After the 87 per cent. of water is removed from milk the dry matter that remains is made up of mineral matter, protein, the carbohydrates, and fat. The blood of the cow contains all of these substances as well as water.

Mineral Matter

Ash is the mineral matter that goes into building the bones of the cow and the unborn calf. The extra mineral matter is used in manufacturing milk.

When a cow is not supplied the right kind of mineral matter for milk making, she draws on her bones for it. She can do this for a limited time *only*. This accounts for so many cows being sway back and in a run-down condition.



Oyster Shell

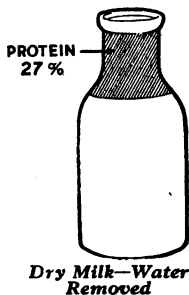
Everybody knows that a hen needs oyster shell or other calcium bearing stone for making the shell of the egg. Yet lots of people milk a cow for years without paying any attention to the cow, who needs the same thing in a different form. Milk has ash or mineral matter in it, just like the egg shell, even though you cannot see it. A cow can't make milk without the proper amount of ash, and if she doesn't get it in her feed she draws from her bones, and is so run down physically that she will often fail to breed, become sway-backed and be ready for the butcher several years ahead of her time.

On the other hand a cow that is fed a balanced ration is able to keep herself in good condition and produce healthy, strong-boned calves. Besides she is able to make an abundant flow of milk without weakening herself.

Protein

The term protein is a class name like automobile. There are hundreds of kinds of protein. Each can do certain work in building hair, hide, horns, hoofs, blood and milk, just the same as a heavy truck or a light runabout does different work.

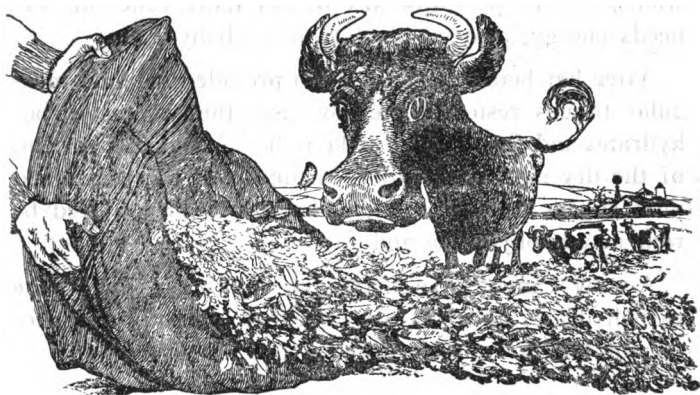
You may give a cow lots of protein, but if it isn't the particular kind she needs, you will not get maximum milk. If you were adrift without water in a row boat on the ocean, you would have an endless supply of salt water, but it would not serve to quench your thirst.



Kinds of Protein

Some people may think *amino acids*, *quality of protein*, and terms like that are only for professors and not for practical dairymen.

Feathers analyze 87 per cent. protein, and with a mixture of feathers, sawdust and a little limestone you could make a ration that would analyze just about as good as could be wanted. But who could make any milk out of a featherbed and a pile of sawdust? The trouble with a ration like this would be that it would not have the right kinds of protein. Feathers are composed largely of one incomplete protein. Milk has two complete proteins, casein and albumen. The casein is the curd and the albumen is the scum that rises to the top when milk is heated. All plants contain some kind of protein, but oats, corn, barley, timothy hay, prairie hay and other ordinary farm products are lacking in certain proteins that are absolutely necessary in milk. The cow cannot make milk without them. These lacking proteins are found in linseed meal, gluten feed from corn, cotton seed meal and alfalfa. (See page 23, lines 1 and 5.)

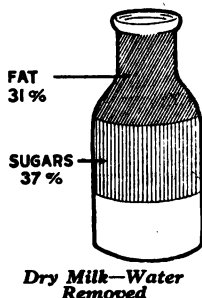


Feathers are largely protein; but you wouldn't feed your cow feathers. Supplying protein to a cow is not enough. It must be the right kind of protein.

Heat and Energy

Milk Sugars and Fat

Energy, heat and fat are supplied by carbohydrates and fat elements in feed. These two materials keep her blood temperature about the same in winter and summer. Carbohydrates are very common, being the sugars and starches. Fat is the oily part of a feed. Carbohydrates and fat are usually shown separately because fat is more concentrated. In milk they are found in certain proportions, depending upon the individual cow and the breed.



A cow's blood is about the same temperature when the thermometer is zero as when it is 90 degrees in the shade. The first thing she must do with the carbohydrates in her feed is to heat her body to the proper temperature and keep it there. Every time she switches her tail,

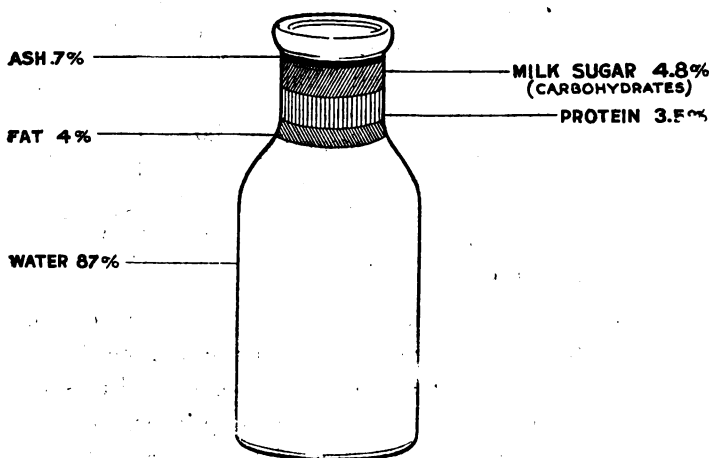
walks, eats or performs any of her daily functions she needs energy, also supplied from carbohydrates.

After her bodily heat has been provided for and muscular tissues restored, the cow uses the surplus carbohydrates and fats to help make milk. About 68 per cent. of the dry matter in milk is made up of these fats and milk sugars. It is especially important that a feed be rich in carbohydrates and fats.

A cow cannot give maximum milk flow unless the carbohydrates and fats are provided in the proper proportion and form. See page 23, line 3.

Summary

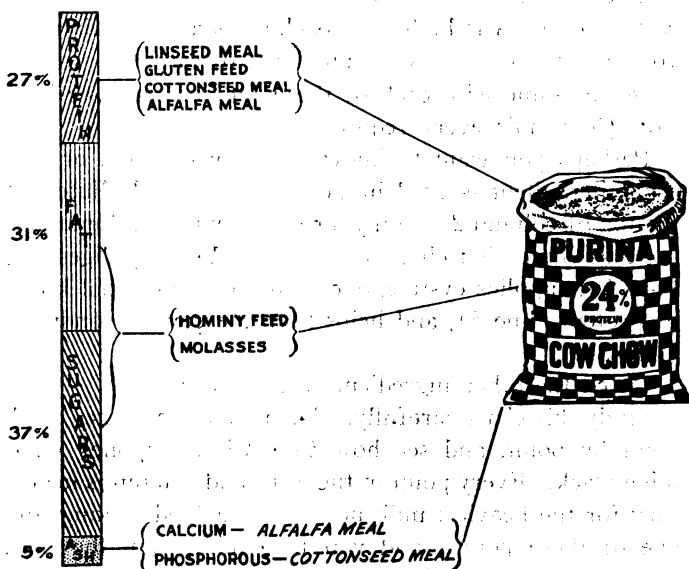
So we see from the preceding pages that milk is made up of water, ash, protein, the carbohydrates, and fats. The illustration below shows what proportion of each one is in a bottle of milk. We have also seen that a cow can produce milk only when she receives these elements in the correct proportions.



Why Cow Chow Makes More Milk

Now then, it stands to reason that if a cow is supplied with plenty of water and a feed that contains practically the same elements as we have found in the dry matter in milk, that cow is bound to produce more milk. Far more than when her feed is mixed by guesswork. The following chart illustrates why Purina Cow Chow is the ideal dairy ration. Because Cow Chow analyzes practically the same as a bottle of milk with the water taken out.

Compare the figures in the chart below with those given on the little illustrations of milk bottles on the preceding pages.



How to Use This Chart

On the opposite page is the whole story in a nutshell of profitable milk-making. Don't take a glance at it and say, "Gosh, that's too deep for me!" Really, it's very simple, and once you understand and use it you are bound to make more money from your cows.

The left-hand column in the heavy black type shows what a cow must get in her feed to make milk profitably: Protein, Digestibility, Carbohydrates, Minerals, Quality of Protein, Bulk, Relish and Condition are explained fully on pages 7 to 13.

The heads of the columns 1 to 6 show the different ingredients you get in Purina Cow Chow.

Now supposing you want to see how Cow Chow supplies the minerals that we have seen a cow must have to produce the maximum amount of milk.

Find "minerals" in the left-hand column, line 4. Run your eye right across line 4. In column 3 you find that cottonseed meal is high in phosphorous and in column 6 you see alfalfa supplies an abundance of calcium.

Do the same with each of the eight lines and see how Cow Chow fills every requirement.

Perhaps you want to know why Corn Gluten or any other ingredient is used in Cow Chow. Find Gluten at the top of column 2. Run your eye down the column and see that Gluten is rich in protein (line 1), very digestible (line 2), supplies cystine, one of the very essential kinds of protein (line 5), and helps keep the cow in condition (line 8).

Check the other ingredients the same way.

Study this chart carefully. Then study any other feed, point by point, and see how Cow Chow supplies what others lack. Every point in the left-hand column is necessary for the heaviest milk flow. Use a feed lacking any one of these points, and you take milk from the pail. Feed Cow Chow and you get more milk.

IN PURINA COW CHOW YOU GET

**TO MAKE MONEY
FROM YOUR COWS
THEIR FEED
SHOULD HAVE**

Line	Column 1 Linseed Meal	Column 2 Gluten Feed from Corn	Column 3 Cottonseed Meal	Column 4 Hominy Feed	Column 5 Molasses	Column 6 Alfalfa	Line
1	35% 	25% 	41% 				1
2	89%	85%	85%	90%	90%		2
3				69% 	65% 		3
4			High in Phosphorus			High in Calcium	4
5	Lysine Tryptophane	Cystine	Lysine Tryptophane			Lysine Tryptophane	5
6						Bulkier than bran or beet pulp	6
7	Very Palatable	Average	Average	Very Palatable	Most palat- able of all feeds	Very palatable	7
8	Recom- mended by all authorities	Stimulates milk flow			Laxative keep- hide sleep		8

See opposite page for explanation of this chart.

Protein
(for milk)

High Digestibility
(reduces waste)

Carbohydrates
(to keep Cow in flesh)

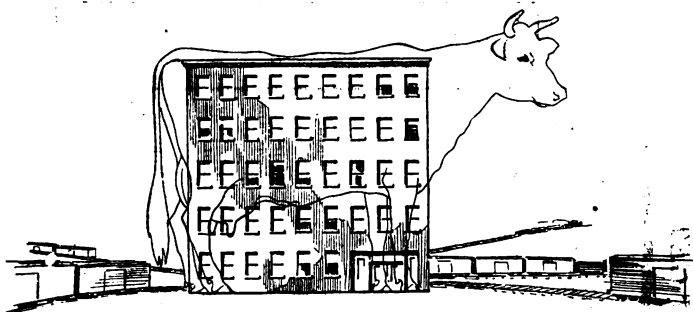
Proper Minerals
(milk and bone)

Quality of Protein

Bulk
(insures digestion)

Relish
(full milk capacity)

Condition



A Cow is a Milk Factory

You can't run any large factory unless the supply department keeps a steady stream of the proper raw materials coming in. In a factory, materials are used for two purposes, first to heat and run the factory, and second, to manufacture into finished products. The cow is just the same.

To Heat and Maintain the Cow

Good, wholesome roughage supplies the body building parts cheaper than they could be obtained elsewhere. That's why everybody knows it's best to feed all the silage, all the good hay and pasture grass the cow will eat.

To Make Milk

"Hay and grass is all they used to feed cows years ago" you might say. Yes, but cows didn't give a fraction as much milk in those times. It's by adding a grain ration to the roughage that the materials for milk-making are supplied.

For years scientists all over the world have studied and experimented to find out exactly how much of protein, carbohydrates and fat it takes to properly maintain a cow and get from her a certain amount of milk.

For example, here's what they agree is the right bal-

ance for a cow weighing 1,000 lbs. and giving 28 lbs. (3½ gallons) of milk a day:

1,000-lb. cow needs every twenty-four hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.70 lbs.	7.00 lbs.	.10 lb.
To produce 28 lbs. of 3½ per cent. milk	1.38 lbs.	6.19 lbs.	.53 lb.
	2.08 lbs.	13.19 lbs.	.63 lb.

Now supposing this cow is eating 35 lbs. of corn silage and 10 lbs. of hay a day. We know the digestible materials in corn silage and hay. Let's figure out what the cow is getting by eating this much of the two:

	Protein.	Digestible Carbohydrates.	Fat.
35 lbs. corn silage contains.....	.39 lbs.	5.26 lbs.	.24 lb.
10 lbs. clover and timothy mixed contains	.40 lbs.	4.20 lbs.	.13 lb.
Total roughage.....	.79 lbs.	9.46 lbs.	.37 lb.

How do these figures compare with those which showed how much the cow needed? We see the cow is getting only a little more than enough to heat and maintain the body and not nearly enough to produce 28 lbs. of milk.

Balancing With Grain

Our problem now is to figure out a grain feed that will supply the right proportions of digestible nutrients to add to what the cow is getting in her roughage to make it equal what she needs to produce 28 lbs. of milk.

Cow Chow has been figured and mixed on just this basis. Add 8 lbs. of Cow Chow to the 35 lbs. of silage and 10 lbs. of hay and see what we get:

	Protein.	Digestible Carbohydrates.	Fat.
Cow needs (see above).....	2.08 lbs.	13.19 lbs.	.63 lb.
Gets from hay and ensilage (see above).....	.79 lb.	9.46 lbs.	.37 lb.
Digests from 8 lbs. of Purina Cow Chow.....	1.60 lbs.	3.60 lbs.	.36 lb.
Result.	2.39 lbs.	13.06 lbs.	.73 lb.

Perhaps you have no ensilage. In that case this is what the same cow should get:

	Protein.	Digestible Carbohydrates.	Fat.
Without silage she needs:			
20 pounds mixed hay.....	.80 lbs.	8.40 lbs.	.26 lb.
8 pounds Purina Cow Chow.....	1.60 lbs.	3.60 lbs.	.36 lb.
Result.	2.40 lbs.	12.00 lbs.	.62 lb.

The following pages show rations figured out the same way for all kinds and sizes of cows and for all kinds of home-grown roughage. Find the table that fits your cow and see how to balance her ration and get more milk.

Holstein or Ayrshire

Timothy Hay

1,200-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.84 lbs.	8.40 lbs.	.12 lbs.
To produce 40 lbs. of 3 per cent milk.....	1.88 lbs.	7.96 lbs.	.68 lbs.
Total needs.....	2.72 lbs.	16.36 lbs.	.80 lbs.
42 pounds corn silage.....	.46 lbs.	6.30 lbs.	.37 lbs.
12 pounds timothy hay.....	.36 lbs.	5.16 lbs.	.14 lbs.
Total roughage.....	.82 lbs.	11.46 lbs.	.51 lbs.
11 pounds Purina Cow Chow..	2.20 lbs.	4.95 lbs.	.50 lbs.
Result	3.02 lbs.	16.41 lbs.	1.01 lbs.
Without silage she needs:			
24 pounds timothy hay.....	.72 lbs.	10.32 lbs.	.28 lbs.
11 pounds Purina Cow Chow..	2.20 lbs.	4.95 lbs.	.50 lbs.
Result	2.92 lbs.	15.27 lbs.	.78 lbs.

1,000-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.70 lbs.	7.00 lbs.	.10 lbs.
To produce 28 lbs. of 3½ per cent milk.....	1.38 lbs.	6.19 lbs.	.53 lbs.
Total needs.....	2.08 lbs.	13.19 lbs.	.63 lbs.
35 pounds corn silage.....	.39 lbs.	5.26 lbs.	.24 lbs.
10 pounds timothy hay.....	.30 lbs.	4.30 lbs.	.12 lbs.
Total roughage.....	.69 lbs.	9.56 lbs.	.36 lbs.
8 pounds Purina Cow Chow..	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.29 lbs.	13.16 lbs.	.72 lbs.
Without silage she needs:			
20 pounds timothy hay.....	.60 lbs.	8.60 lbs.	.24 lbs.
8 pounds Purina Cow Chow..	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.20 lbs.	12.20 lbs.	.60 lbs.

Holstein or Ayrshire

Mixed Hay—Clover and Timothy

1,200-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.84 lbs.	8.40 lbs.	.12 lbs.
To produce 40 lbs. of 3 per cent milk.....	1.88 lbs.	7.96 lbs.	.68 lbs.
Total needs.....	2.72 lbs.	16.36 lbs.	.80 lbs.
42 pounds corn silage.....	.46 lbs.	6.30 lbs.	.37 lbs.
12 pounds mixed hay.....	.50 lbs.	5.16 lbs.	.16 lbs.
Total roughage.....	.96 lbs.	11.46 lbs.	.53 lbs.
11 pounds Purina Cow Chow.....	.20 lbs.	4.95 lbs.	.50 lbs.
Result	3.16 lbs.	16.41 lbs.	1.03 lbs.
Without silage she needs:			
24 pounds mixed hay.....	.96 lbs.	10.08 lbs.	.31 lbs.
11 pounds Purina Cow Chow.....	.20 lbs.	4.95 lbs.	.50 lbs.
Result	3.16 lbs.	15.03 lbs.	.81 lbs.

1,000-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.70 lbs.	7.00 lbs.	.10 lbs.
To produce 28 lbs. of 3½ per cent milk.....	1.38 lbs.	6.19 lbs.	.53 lbs.
Total needs.....	2.08 lbs.	13.19 lbs.	.63 lbs.
35 pounds corn silage.....	.39 lbs.	5.26 lbs.	.24 lbs.
10 pounds mixed hay.....	.40 lbs.	4.20 lbs.	.13 lbs.
Total roughage.....	.79 lbs.	9.46 lbs.	.37 lbs.
8 pounds Purina Cow Chow.....	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.39 lbs.	13.06 lbs.	.73 lbs.
Without silage she needs:			
20 pounds mixed hay.....	.80 lbs.	8.40 lbs.	.26 lbs.
8 pounds Purina Cow Chow.....	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.40 lbs.	12.00 lbs.	.62 lbs.

Holstein or Ayrshire

**Clover, Average Alfalfa, Cow Pea, Lespedeza or
Peanut Hay with Nuts**

1,200-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.84 lbs.	8.40 lbs.	.12 lbs.
To produce 40 lbs. of 3 per cent milk.....	1.88 lbs.	7.96 lbs.	.68 lbs.
Total needs.....	2.72 lbs.	16.36 lbs.	.80 lbs.
42 pounds corn silage.....	.46 lbs.	6.30 lbs.	.37 lbs.
12 pounds clover or av. alfalfa	.85 lbs.	4.56 lbs.	.20 lbs.
Total roughage.....	1.31 lbs.	10.86 lbs.	.57 lbs.
8 pounds Purina Cow Chow..	1.60 lbs.	3.60 lbs.	.36 lbs.
*3 pounds corn and cob meal.	.13 lbs.	1.80 lbs.	.09 lbs.
Result	3.04 lbs.	16.26 lbs.	1.02 lbs.
Without silage she needs:			
24 pounds clover or av. alfalfa	1.70 lbs.	9.12 lbs.	.40 lbs.
5 pounds Purina Cow Chow..	1.00 lbs.	2.25 lbs.	.23 lbs.
*7 pounds corn and cob meal.	.32 lbs.	4.20 lbs.	.21 lbs.
Result	3.02 lbs.	15.57 lbs.	.84 lbs.

	Protein.	Digestible Carbohydrates.	Fat.
1,000-lb. Cow Needs			
To maintain body.....	.70 lbs.	7.00 lbs.	.10 lbs.
To produce 28 lbs. of 3½ per cent milk.....	1.38 lbs.	6.19 lbs.	.53 lbs.
Total needs.....	2.08 lbs.	13.19 lbs.	.63 lbs.
35 pounds corn silage.....	.39 lbs.	5.26 lbs.	.24 lbs.
10 pounds clover or av. alfalfa	.71 lbs.	3.80 lbs.	.18 lbs.
Total roughage.....	1.10 lbs.	9.06 lbs.	.42 lbs.
6 pounds Purina Cow Chow..	1.20 lbs.	2.70 lbs.	.27 lbs.
*2 pounds corn and cob meal.	.09 lbs.	1.20 lbs.	.06 lbs.
Result	2.39 lbs.	12.96 lbs.	.75 lbs.
Without silage she needs:			
20 pounds clover or av. alfalfa	1.42 lbs.	7.60 lbs.	.36 lbs.
4 pounds Purina Cow Chow..	.80 lbs.	1.80 lbs.	.18 lbs.
*4 pounds corn and cob meal.	.18 lbs.	2.40 lbs.	.12 lbs.
Result	2.40 lbs.	11.80 lbs.	.66 lbs.

*Oats, barley, milo or wheat middlings can be used in place of corn and cob meal.

Jersey, Guernsey or Brown Swiss

Timothy Hay

900-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.63 lbs.	6.30 lbs.	.09 lbs.
To produce 32 lbs. of 4½ per cent milk.....	1.83 lbs.	8.44 lbs.	.72 lbs.
Total needs.....	2.46 lbs.	14.74 lbs.	.81 lbs.
32 pounds corn silage.....	.35 lbs.	4.80 lbs.	.22 lbs.
9 pounds timothy hay.....	.27 lbs.	3.90 lbs.	.09 lbs.
Total roughage.....	.62 lbs.	8.70 lbs.	.31 lbs.
10 pounds Purina Cow Chow..	2.00 lbs.	4.50 lbs.	.45 lbs.
Result	2.62 lbs.	13.20 lbs.	.76 lbs.
Without silage she needs:			
18 pounds timothy.....	.54 lbs.	7.80 lbs.	.18 lbs.
12 pounds Purina Cow Chow..	2.40 lbs.	5.40 lbs.	.54 lbs.
Result	2.94 lbs.	13.20 lbs.	.72 lbs.

800-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.56 lbs.	5.60 lbs.	.08 lbs.
To produce 20 lbs. of 5 per cent milk.....	1.21 lbs.	5.68 lbs.	.49 lbs.
Total needs.....	1.77 lbs.	11.28 lbs.	.57 lbs.
28 pounds corn silage.....	.31 lbs.	4.20 lbs.	.20 lbs.
8 pounds timothy hay.....	.24 lbs.	3.44 lbs.	.10 lbs.
Total roughage.....	.55 lbs.	7.64 lbs.	.30 lbs.
7 pounds Purina Cow Chow..	1.40 lbs.	3.15 lbs.	.32 lbs.
Result	1.95 lbs.	10.79 lbs.	.62 lbs.
Without silage she needs:			
16 pounds timothy hay.....	.48 lbs.	6.88 lbs.	.20 lbs.
8 pounds Purina Cow Chow..	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.08 lbs.	10.48 lbs.	.56 lbs.

Jersey, Guernsey or Brown Swiss

Mixed Hay—Clover and Timothy

900-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.63 lbs.	6.30 lbs.	.09 lbs.
To produce 32 lbs. of 4½ per cent milk.....	1.83 lbs.	8.44 lbs.	.72 lbs.
Total needs.....	2.46 lbs.	14.74 lbs.	.81 lbs.
32 pounds corn silage.....	.35 lbs.	4.80 lbs.	.22 lbs.
9 pounds mixed hay.....	.36 lbs.	3.78 lbs.	.11 lbs.
Total roughage.....	.71 lbs.	8.58 lbs.	.33 lbs.
10 pounds Purina Cow Chow..	2.00 lbs.	4.50 lbs.	.45 lbs.
Result	2.71 lbs.	13.08 lbs.	.78 lbs.
Without silage she needs:			
18 pounds mixed hay.....	.72 lbs.	7.56 lbs.	.22 lbs.
12 pounds Purina Cow Chow..	2.40 lbs.	5.40 lbs.	.54 lbs.
Result	3.12 lbs.	12.96 lbs.	.76 lbs.

800-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.56 lbs.	5.60 lbs.	.08 lbs.
To produce 20 lbs. of 5 per cent milk.....	1.21 lbs.	5.68 lbs.	.49 lbs.
Total needs.....	1.77 lbs.	11.28 lbs.	.57 lbs.
28 pounds corn silage.....	.31 lbs.	4.20 lbs.	.20 lbs.
8 pounds mixed hay.....	.32 lbs.	3.36 lbs.	.10 lbs.
Total roughage.....	.63 lbs.	7.56 lbs.	.30 lbs.
7 pounds Purina Cow Chow..	1.40 lbs.	3.15 lbs.	.32 lbs.
Result	2.03 lbs.	10.71 lbs.	.62 lbs.
Without silage she needs:			
16 pounds mixed hay.....	.64 lbs.	6.72 lbs.	.20 lbs.
8 pounds Purina Cow Chow..	1.60 lbs.	3.60 lbs.	.36 lbs.
Result	2.24 lbs.	10.32 lbs.	.56 lbs.

Jersey, Guernsey or Brown Swiss .

Clover, Average Alfalfa, Cow Pea, Lespedeza or Peanut Hay With Nuts

900-lb. Cow Needs Every 24 Hours (in pounds):

	Protein.	Digestible Carbohydrates.	Fat.
To maintain body.....	.63 lbs.	6.30 lbs.	.09 lbs.
To produce 32 lbs. of 4½ per cent milk.....	1.83 lbs.	8.44 lbs.	.72 lbs.
Total needs.....	2.46 lbs.	14.74 lbs.	.81 lbs.
32 pounds corn silage.....	.35 lbs.	4.80 lbs.	.22 lbs.
9 pounds clover or av. alfalfa .	.64 lbs.	3.42 lbs.	.16 lbs.
Total roughage.....	.99 lbs.	8.22 lbs.	.38 lbs.
7 pounds Purina Cow Chow..	1.40 lbs.	3.15 lbs.	.32 lbs.
*4 pounds corn and cob meal.	.18 lbs.	2.40 lbs.	.12 lbs.
Result	2.57 lbs.	13.77 lbs.	.82 lbs.
Without silage she needs:			
18 pounds clover or av. alfalfa.	1.68 lbs.	6.84 lbs.	.32 lbs.
4 pounds Purina Cow Chow..	.80 lbs.	1.80 lbs.	.18 lbs.
*7 pounds corn and cob meal.	.32 lbs.	4.20 lbs.	.21 lbs.
Result	2.80 lbs.	12.84 lbs.	.71 lbs.

	Protein.	Digestible Carbohydrates.	Fat.
800-lb. Cow Needs			
To maintain body.....	.56 lbs.	5.60 lbs.	.08 lbs.
To produce 20 lbs. of 5 per cent milk.....	1.21 lbs.	5.68 lbs.	.49 lbs.
Total needs.....	1.77 lbs.	11.28 lbs.	.57 lbs.
28 pounds corn silage.....	.31 lbs.	4.20 lbs.	.20 lbs.
8 pounds clover or av. alfalfa .	.57 lbs.	3.04 lbs.	.14 lbs.
Total roughage.....	.88 lbs.	7.24 lbs.	.34 lbs.
4 pounds Purina Cow Chow..	.80 lbs.	1.80 lbs.	.18 lbs.
*3 pounds corn and cob meal.	.14 lbs.	1.80 lbs.	.09 lbs.
Result	1.82 lbs.	10.84 lbs.	.61 lbs.
Without silage she needs:			
16 pounds clover or av. alfalfa.	1.14 lbs.	6.08 lbs.	.28 lbs.
3 pounds Purina Cow Chow..	.60 lbs.	1.35 lbs.	.14 lbs.
*5 pounds corn and cob meal.	.23 lbs.	3.00 lbs.	.15 lbs.
Result	1.97 lbs.	10.43 lbs.	.57 lbs.

*Oats, barley or millo can be used in place of corn and cob meal.

Johnson Grass, Prairie Hay and Cow Chow

Johnson grass and prairie hay analyze the same as clover and timothy mixed. Refer to pages 27 and 30, on which you will find rations with mixed hay for all breeds.

How to Use Cotton Seed Hulls

People speak of cottonseed hulls as a filler. Just what does "filler" mean? It means something to keep the cow's four stomachs distended.

She will not do her best with only a small amount of concentrate in the large space her stomachs provide.

Cottonseed hulls will fill up the stomachs, but they will give very little material for milk making. This is because of every 100 lbs. of cottonseed hulls eaten a cow only digests about 33 lbs., and it takes nearly all of the 33 lbs. to pass the 100 lbs. through the system.

If the cow's stomach is filled with hay or ensilage, even though hay costs more than hulls, it not only will keep her contented, but the hay being so much more highly digestible, will supply the materials for maintaining the cow's body and allow the grain feed to go into the milk pail.

When roughness is especially short, it may pay to feed a gallon of hulls morning and a gallon evening to each cow, but any more than this will be unprofitable.

How to Use Corn Shucks

When hay is scarce, corn shucks may be used to good advantage. They compare favorably with ordinary mixed hay, prairie hay or Johnson grass. Being less palatable than these, it is sometimes difficult to get the cow to eat enough to maintain her body. When feeding corn shucks,

it is well to mix them with the grain feed, so that the cow will have to eat them to get the more palatable concentrate.

How to Use Corn Stover

This roughage may be kept where the cows can pick at it, but it is not well to attempt to use it in place of hay or corn silage. While it has a fair chemical value it is unpalatable and the cows will not eat any large quantity. If you are forced to use this material as part of the roughness, it is well to chop it up and soak it in warm water before feeding. This will make it more palatable and more digestible.

How to Use Cow Pea, Lespedeza and Peanut Hay With Nuts

All of these hays analyze about the same as clover and the rations on page 28 show the way to use Cow Chow in connection with these hays.

How Much Roughage to Give a Cow in 24 Hours

<i>Weight of Cow.</i>	<i>Ensilage and Hay.</i>	<i>Hay Only.</i>
700 lbs.	24 lbs. ensilage and 7 lbs. hay.	14 lbs.
800 lbs.	28 lbs. ensilage and 8 lbs. hay.	16 lbs.
900 lbs.	31 lbs. ensilage and 9 lbs. hay.	18 lbs.
1,000 lbs.	35 lbs. ensilage and 10 lbs. hay.	20 lbs.
1,100 lbs.	38 lbs. ensilage and 11 lbs. hay.	22 lbs.
1,200 lbs.	42 lbs. ensilage and 12 lbs. hay.	24 lbs.
1,300 lbs.	45 lbs. ensilage and 13 lbs. hay.	26 lbs.
1,400 lbs.	49 lbs. ensilage and 14 lbs. hay.	28 lbs.
1,500 lbs.	52 lbs. ensilage and 15 lbs. hay.	30 lbs.

Government tests show that six acres of good blue grass pasture per cow are necessary for maintaining milk production without drawing on the body. If each of your cows does not have this much good pasture, their roughage should be supplemented with Purina Cow Chow. See section on pasture feeding.

How to Figure Amount of Silage Remaining in Silo

In the course of a year many inquiries come to this office requesting information on the amount of silage that remains in a partially emptied silo.

In order to estimate the amount it is necessary to know the depth of the silage.

One would naturally suppose that the lengths into which the silage was cut would influence greatly the weight of a cubic foot of settled silage. Data from experiments show that there was no appreciable difference in weight per cubic foot.

Estimated Weight of Settled Silage

Depth of silage, feet	Average weight of silage to the cubic foot to this depth.	Diameter of silo.					
		10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.
	Lbs.	Tons	Tons	Tons	Tons	Tons	Tons
1	32.0	1.2	1.8	2.4	3.2	4.0	5.0
5	33.4	6.5	9.4	12.8	16.7	21.2	26.2
10	35.0	13.7	19.7	26.9	35.1	44.4	54.9
15	36.4	21.4	30.8	42.0	54.8	69.3	85.7
20	37.5	29.4	42.4	57.7	75.3	95.2	117.7
25	38.3	37.6	54.1	73.7	96.2	121.6	150.3
30	39.0	45.9	66.0	90.0	117.5	148.5	183.6

Fertilizer

One ton of Purina Cow Chow contains the following fertilizer elements:

Nitrogen 77.6 lbs.
 Phosphoric acid 24.7 lbs.
 Potash 27.7 lbs.

How to Feed a Dry Cow

Proper feeding and care during the time a cow is dry have a tremendous effect on her milk production during the following lactation period.

It should be borne in mind that when the cow has been carrying a calf and producing a large quantity of milk at the same time she is under a tremendous strain, and that unless special care has been taken in her feeding, she has probably been drawing on her own body for nourishment of the calf and production of milk, or has been building an imperfect calf.

It is a common belief that some cows cannot be dried up long enough for a sufficient rest period. However, expert herdsmen find that no injury results from drying up a cow giving as much as 8 to 10 quarts daily, if one milking a day is omitted for several days, and the animal then partly milked out after skipping an entire day.

Keep Breeding Record

Intelligent care of the dry cow cannot be given unless a breeding record is kept, due to the fact that some cows will drop a calf a month or more before appearances indicate. Occurrences of this kind are extremely detrimental to the cow, and very unprofitable to the owner.

Cows should not be allowed to get too thin as they near the end of their lactation period. When they have been dried up gradually, they should receive a liberal feed, and one that is intended to repay the loans that the cow's body has made to the milk pail and to the calf.

Because cows need calcium, particularly, during their rest period, attention should first be given to that item; and Purina Cow Chow, containing a high grade of alfalfa meal, supplies the lacking calcium and at the same time carries the high protein necessary for nourishing the unborn calf.

Gallon of Cow Chow a Day When Dry

When a cow has been dried up, she should be getting about a gallon of Cow Chow a day, and this ration should be gradually increased, so that the cow is in good flesh before calving. Some breeders find ten or twelve pounds of Cow Chow a day a very satisfactory feed, but this is more than the average cow will need.

Purina O-Molene or Fatena Splendid Conditioners

Should a cow be run down in flesh and not fatten readily, a quart or two of Purina O-Molene or Purina Steer Fatena to take the place of an equal amount of Purina Cow Chow will put on fat readily and keep the system in splendid condition.

Reduce at Calving Time

Any ill effects that may follow the period of rest before calving are usually due to insufficient exercise and over-feeding. Three to four days before cows are due to calve the grain ration should be reduced gradually until at calving time they are eating only a few pounds daily. About five hours after calving the cow should have a warm bran mash, of a sloppy consistency. It is well to have the drinking water slightly warmed. Milk fever frequently follows drinking large quantities of cold water after calving. Warm bran mash should also be fed for two or three days after calving or until the danger of milk fever is passed. Purina Cow Chow may then be gradually resumed.

Purina Steer Fatena to Fatten Cows for Butcher

For a dry cow that is to be sold to the butcher, Purina Steer Fatena is an ideal ration for putting on weight quickly and bringing a good price for beef rather than a canner's price that the average dry dairy cow will bring.

How to Feed on Pasture

This is a matter that requires more skill in feeding than at any other time of the year.

When cows are first put out on fresh, green pasture in the early spring, they are stimulated by the fresh air, green grass, room to exercise and all the other pleasant changes from the barn, and put more milk into the pail than could be made from the grass they eat.

This stimulation keeps up for a while and during that period you cannot increase a cow's milk much by adding any concentrates to her ration. But by adding concentrate at that time, you do increase the milk flow in the fall and following winter, because the nutrients taken from the concentrates make up for the cow's drawing on her system, and keep her at top speed that much longer.

Danger of Not Feeding Concentrate

If the cow does not get a concentrate during this time, she gradually comes down in her milk flow and later in the summer has to build up into her body again, the materials taken from it during the period of stimulation. This is especially hard in the late summer, as by that time grass is burned and has very little nourishment.

Generally speaking, a cow should have a gallon of concentrates night and morning, if she is giving over three gallons of milk a day, and above three gallons, should have a pound of concentrates for every three or three and one-half pounds of milk. When pastures are dried up in the late summer, a cow should be fed the same amount of concentrate as in the winter time.

Ben Franklin's Method

Did you ever hear about the way Ben Franklin used to handle a weighty problem, or make a decision that seemed difficult? He would take a piece of paper, draw a line straight down the middle and then put the arguments for the plan on one side and against it on the other. As different reasons came to his mind, either for or against, he would write them down immediately and then after thinking of every possible argument, he would study the paper to see which side over-balanced the other.



If he found a reason on one side that about equalled the reason on the other, he would scratch the two equal ones out and finally have it reduced to only a few problems which he could easily weigh in his mind. Let us look at the summer feeding problem just the way Ben Franklin would have.

The questions that are easiest to weigh against each other are those that can be compared in equal terms.

We find there are two points about labor—one saving labor and the other making a little more labor. We can scratch those two out.

The next two that can be easily compared are those expressing profit in dollars and cents. We find that we have three pounds of extra milk from one pound of feed. This not only cancels the disadvantage of the price but still leaves a big advantage in the way of profit.

If the extra milk would *only* pay for the feed, the other advantages would make Purina Cow Chow on pasture a splendid investment.

With your money invested in cows, equipment and land, you cannot afford not to feed Purina Cow Chow this summer. You will find that your neighbors who fed it last summer are all going to do so again.

Here's our line down the page and here are the Advantages and Disadvantages:

Advantages of Feeding Purina Cow Chow on Pasture

1. Six pounds of extra milk from two pounds of Purina Cow Chow with any good cow.
2. A little dry feed in the morning before going on to a dewy pasture will prevent over-eating and bloat.
3. Save fall feed. Cows not fed grain in the summer require extra feed in the fall to build them up and put them in shape. It is cheaper to keep them in shape than to put them in shape with extra feed in the fall when it usually costs more.
4. In a high protein feed like Purina Cow Chow, the fertilizing value is much higher and your pastures will be better next year.
5. A cow can eat from 30 to 60 pounds of grass in a day. That is hardly as much dry matter as she gets out of silage and hay in the winter time. Silage and hay won't bring a cow to full capacity in the winter and grass won't do it in the summer.
6. Lower your overhead cost per gallon by bringing each cow to fuller capacity and making her produce more milk per year. That's what increases your profit per gallon.
7. With Purina Cow Chow cows can produce one or two years longer than when milked hard on pasture alone.
8. Get more milk in fall and winter by having them come off pasture in good shape and at the highest possible point in production.
9. It takes about six acres of ordinary grass to maintain one cow. Very few dairymen have six acres of good pasture for every cow they are milking.
10. Saves labor because the cows come up to the barn without having to be driven.
11. Better calves and a better milk flow after calving.

Disadvantages

1. Initial cost of Purina Cow Chow.
2. Time taken in feeding it.

How to Get an Extra Pound of 10% Milk

A cow can be trained to give *more milk* and *richer milk* in somewhat the same manner that a horse is trained to make more speed—that is, by being regularly and repeatedly urged to do so. The reason for this is clear when we consider how milk is made.

The cow's udder is more than just a bag to be emptied at milking time. It is truly a milk-making organ, controlled by the cow's nervous system. On page 15 the manner in which milk-making materials are stored in the cells of the udder is described. At milking time these materials are turned into milk. The speed with which this change takes place depends very largely on the cow's nervous condition. If she is frightened or excited the milker says, "She does not give down her milk." The fact is she cannot make the milk.

On the other hand, if she is contented and comfortable, proper manipulation of the udder will encourage her to turn more than the usual amount of milk-making material into milk. That is, she will "give down" an extra amount.

The Milker's Responsibility

The milker's responsibility for getting the most out of the cow is fully as great as the feeder's responsibility for giving her a proper ration. It is only by correct milking methods that the full benefit of feeding Purina Cow Chow can be realized. These methods are so simple that they are learned by practically every peasant boy and girl in many parts of Europe; they are thoroughly practical, and take very little time. The average increase produced by these methods on twelve farms, milking a total of 142 cows, was:

Increase in milk. 5.3 per cent. or 1.08 lbs. per day
Increase in butter fat. . . 12.6 per cent. or .1 lb. per day

The average test of the extra milk given was 10 per cent. butter fat.

Starting to Milk

Since making milk is dependent on the cow's nervous condition, she must always be approached in a quiet, friendly manner which will put her entirely at her ease and give her confidence in her master.

A little time taken to wash the flanks and udder with warm water in winter and cool water in summer is well spent from a milk-making standpoint as well as absolutely necessary from the standpoint of sanitation. The washing should be followed by careful drying.

The addition of a little odorless antiseptic such as B. K. solution will keep the teats free from sores which otherwise develop, and make them soft and pliable.

It is well to begin milking slowly and increase the speed as the milk comes down, keeping on without interruption with the pair of teats first started until the stream becomes small, then milk the other pair and come back to the first pair to get the milk which has accumulated in the meantime. The second pair will then be ready for re-milking. During this operation the full hand should be used. *Never strip with the thumb and forefinger*, as this is a waste of time and tends to injure the conformation of the udder.

Getting the Extra Milk

This is the point at which ordinary milking methods stop. Extra milk of surprisingly high butter fat content can be secured by manipulating the udder. The object of such manipulation is to bring light pressure on every part of the udder. This acts as a stimulant on the milk-making cells, causing them to give up the last bit of milk-making materials they hold. The systematic application of such a method at each milking also causes the cells to store larger amounts of such materials.

The Method of Manipulation

There are several different methods of manipulation. The method described below originated with Dr. Heglund of Norway.

When the first milking is completed, set the bucket aside, grasp the hindquarters as shown in Figure 1, pressing the two together firmly. Do the same with the two front quarters. Then press the two right quarters together as shown in Figure 2, do the same with the two left quarters. Then reach as far up as possible and gently massage the cow's udder as shown in Figure 3.



Fig. 1.

Too much force should not be used. The object is to bring light pressure on every part of all quarters. Now milk the cow again.

This remilking will be found much more rapid than ordinary stripping with the thumb and forefinger, since the stimulated glands have given down their milk so that it can all be drawn with a full hand movement. When the stream becomes small, instead of stripping continue to milk with the full hand and at the same time massage the quarter being milked as shown in Figure 4, page 44. The massage should be started close up to the body.

Test of the Method

A county agent in Iowa had attempted to convince some of his people that very thorough milking was a practical way of increasing the flow of milk and at the same time considerably raising the test. One of his men

simply wouldn't try the method as he didn't think it practical. The county agent happened out to his farm at milking time one evening.



Fig. 2.

Just as he sat down to a heifer the farmer was given a pint bottle and asked to fill it with milk. When he started to get up and go to the next cow, the county agent handed him another pint bottle and asked him to fill it from the heifer. The farmer objected

that he had milked her dry, but after some urging finally made the attempt and succeeded in filling the pint bottle. This man had a Babcock tester and later in the evening was much surprised to find that the first bottle of milk tested $2\frac{1}{2}$ per cent. The second bottle tested 15 per cent.

The Plan is Practical

Anyone who objects to this plan of urging the cow to do her utmost, should stop to think how commonly the opposite effect is accepted. If a cow is not thoroughly milked she will soon dry up. Does it not stand to reason that if she is very thoroughly milked she will be stimulated to extra production. This is just nature's way of regulating the cow's milk-giving power to the needs of the calf.



Fig. 3.

The extra production fully demonstrates the value of going

to the small extra effort, as it must be remembered that all of this gain is extra milk which costs nothing but the trouble of drawing. A milker soon becomes so skillful in the routine of udder manipulation that the greater freedom with which the milk comes down more than offsets the time taken for massage.

It Works With Machine as Well as With Hand Milking

It takes less time to manipulate the udder while the milking machine is attached and allow the machine to do most of the stripping than to strip by hand. All that



Fig. 4.

has been said for udder manipulation with hand milking, is equally true with machine milking. Extra milk and a higher average test are produced.

Besides getting extra milk from this massaging, there is another big point in its favor. Many udder troubles come from cows not being thoroughly milked. The massage avoids all such troubles.

How to Tell a Good Cow

There are 24,000,000 cows in the United States and it is estimated that more than half of them are unprofitable. Many of these unprofitable cows would have been sold for beef long ago if the owner knew a few of the characteristics that mark the good dairy type of cow or the poor type.

Below are the main points that show the ideal type of dairy cow as given by the Wisconsin Experiment Station, bulletin 274. Of course, no cow is perfect, but every farmer should satisfy himself that his cows have most of the following characteristics:

1. Good size for her breed.
2. Good feed capacity.
3. Dairy disposition.
4. A good udder.
5. Good constitution and health.
6. Dairy breeding.
7. Large capacity for milk and butter fat production.
8. Power to produce offspring of her type and breeding.

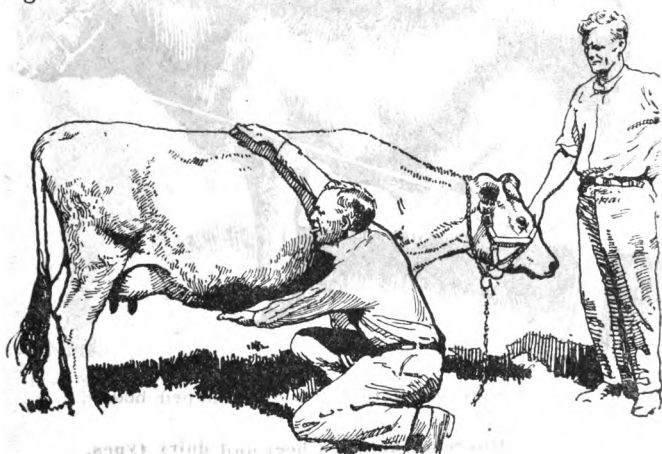
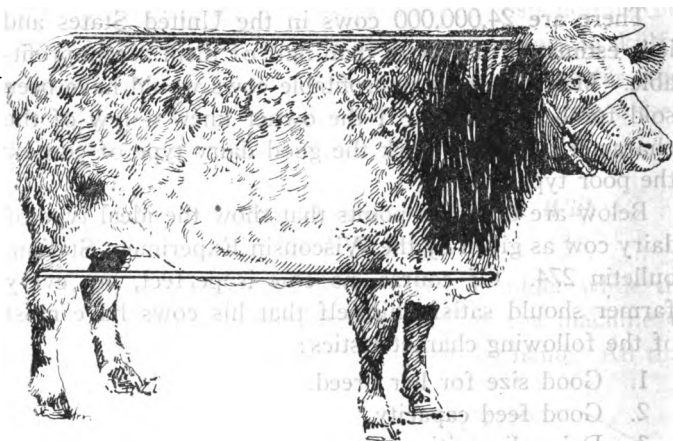
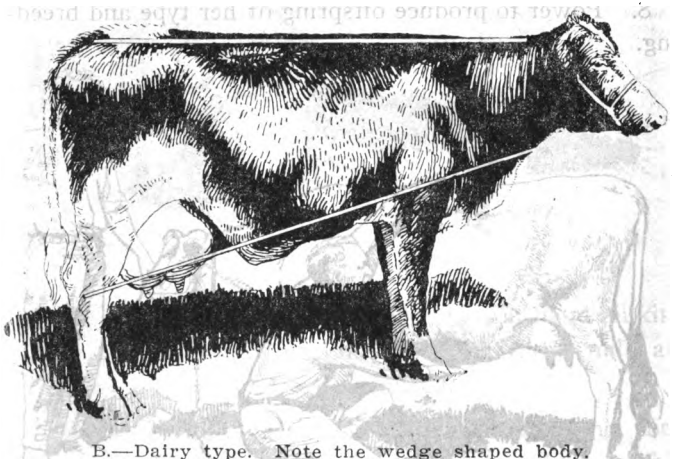


Fig. 1. A large barrel, showing great digestive and feed capacity, is essential. See page 48.



A.—Beef type. Note the straight lines of the body.



B.—Dairy type. Note the wedge shaped body.

Fig. 2. Difference between beef and dairy types.



A.—Beef type has full forequarters.



B.—Dairy type—note the sharp brisket.



C.—Beef type has full hindquarters.



D.—Dairy type. Note the prominent udder attached high up in rear.

Fig. 3. Beef animals are blocky, dairy cattle angular.

A Large Body

A cow cannot produce an abundance of milk unless she has a large body to hold feed. The milk manufacturing machinery inside of the cow is very complicated. The digestive organs must have plenty of room in which to operate and have enough room to hold plenty of feed to keep them operating.

Large Feed Capacity

This point of having plenty of room to hold feed is a most important one. The cow should have a large barrel indicating a roomy place for storing and digesting feed.

A big cow is usually much more profitable than the small cow.

It costs little more to keep and feed a big cow than a small one, but the big cow usually produces considerably more milk.

Other points that indicate large digestive capacity are:

Ribs well sprung and far apart.

An open chine.

Back wide over the loins.

Large barrel.

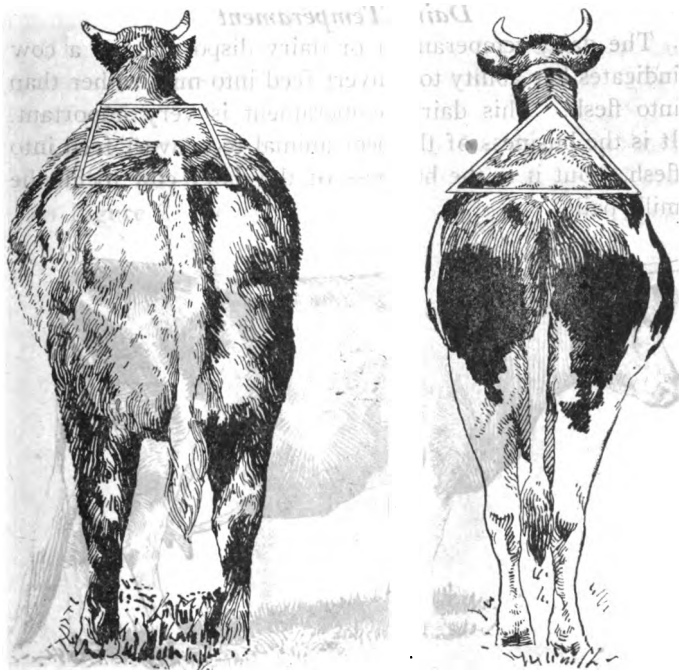
Hips wide apart.

Rear flanks full and great depth from hips to lower line of the flank.

Wide forehead, comparatively long face, broad muzzle, good-sized mouth and strong, sinewy jaws.



Fig. 4. Showing two of the wedges. The body should be narrow at the withers, widening toward the hips and toward the floor of the chest. Note also the long, narrow neck.



A.

B.

Fig. 5. Note the difference between the top lines of the beef and dairy types. Beef animals change feed into flesh and develop a thickly fleshed back. The dairy cow uses feed to make milk. Her back is **wedge shaped**.

The Three Wedges

Experience has shown that the body of a dairy cow should be shaped like a wedge when viewed from three angles.

First wedge—front view, see Figure 4. The cow should be wider at the floor of the chest than at the withers.

Second wedge—side view, see Figure B. The cow should be deeper from the hip points to the bottom of the udder than at the chest. The body should slope down toward the rear.

Third wedge—top view, see Figure B. The cow's hips should be wider than the withers.

Dairy Temperament

The dairy temperament or dairy disposition of a cow indicates her ability to convert feed into milk rather than into flesh. This dairy temperament is very important. It is the business of the beef animal to convert feed into flesh. But it is the business of the dairy cow to fill the milk pail.

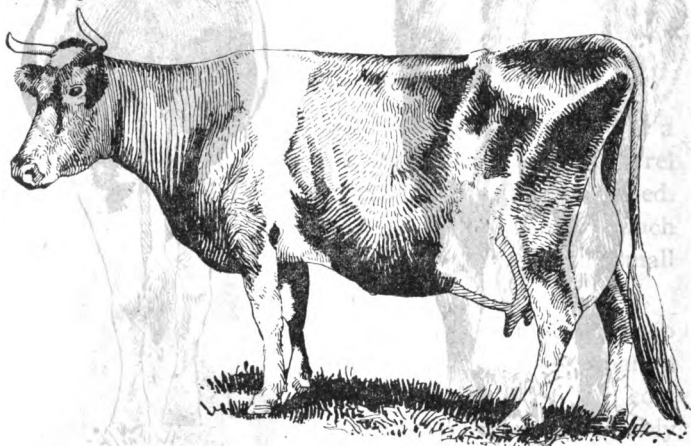


Fig. 6. Showing a cow with marked dairy temperament.

Cows with the proper dairy temperament show the following characteristics:

Features about the head and face clean cut.

Eyes prominent, bright and active.

Neck clean, neatly joined to head, not too full at the throat and comparatively long and thin.

Backbone, hips and *pin bones* prominent and sharp.

Ribs prominent and open.

Thighs thin and incurving "cat hams."

Bones all over the body indicate quality rather than coarseness.

Skin thin and pliable.

In judging dairy temperament consideration must be made for the age, size, breed and stage of lactation of the animal.

The Udder

The udder is the milk-secreting organ. No cow can make satisfactory milk production with a poorly developed udder.

The udder should be large, well proportioned, balanced, extended far forward, and high up between the thighs. See Figure 2. It should be of fine texture, pliable, and

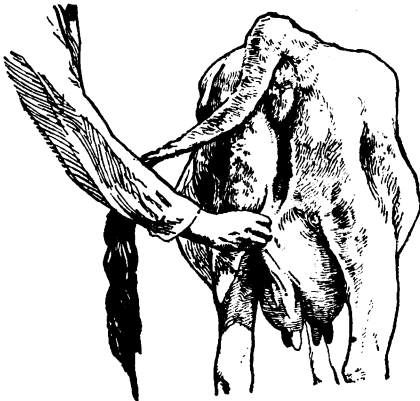


Fig. 7. The skin of the udder should be of fine texture and pliable. After milking it should stretch readily at the point shown in the picture.

the skin should stretch readily when the udder has been milked out. See Figure 7. The teats should be large, well placed, and far apart, so as to be handy for milking.

Good Circulation of Blood

The cow makes milk from blood. If she is going to give a large flow of milk there must be good blood circulation. The size of the milk veins or mammary veins along the under side of the body shows how much blood is being carried away from the udder. These veins should be large and crooked.

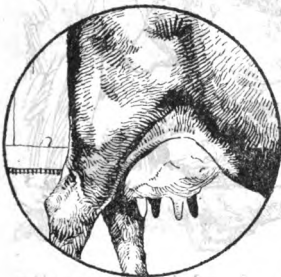


Fig. 8. Prominent udder veins indicate good circulation. Teats of good size and well placed make milking easier.

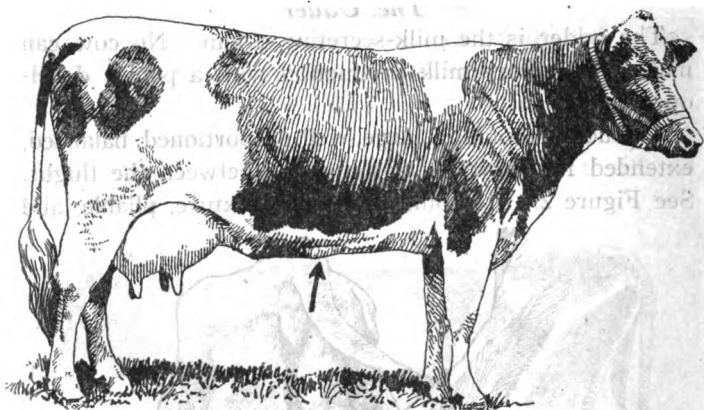


Fig. 9. The veins from the udder should be large and crooked, showing an abundant supply of blood.

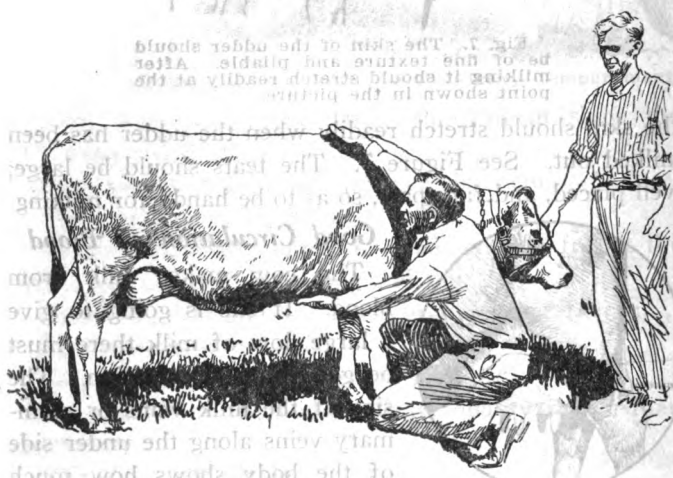


Fig. 10. A deep chest shows great lung and heart capacity which indicates vigor, ruggedness and constitution.

Other indications of good circulation are as follows:

Prominent veins on the udder; and oily, healthy condition of the skin and an oily secretion noted in the ears and at the end of the tail.

Large open nostrils provide ample air passages to the lungs for purification.

Good Constitution and Health

A cow must have a strong constitution to be profitable. One lacking in vitality is rarely a good feeder and consequently cannot produce much milk. Besides the cow with a strong constitution that can produce offspring of her own kind year after year is most profitable.

A deep chest indicates a cow of vigor and health because it means greatness of heart and lung capacity. The coat should be smooth and glossy with hair short. The skin should be soft and pliable. Shaggy unkempt cows are usually in poor condition.

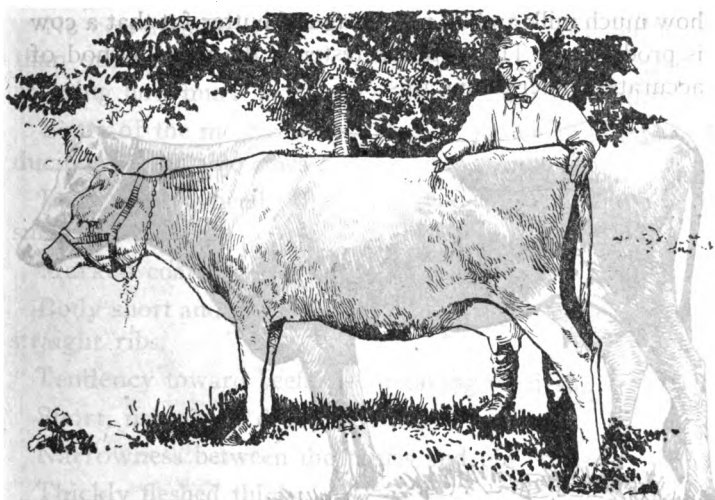


Fig. 11. The rump should be long and wide, level from the pin bones to the hips and nearly level laterally. The tail should not rise but should carry out a straight horizontal line until it drops abruptly. Cows with roomy hindquarters bear calves more successfully.

Dairy Breeding

The dairy type of cow has been produced by centuries of special breeding and feeding. Naturally no cow will show marked dairy characteristics unless she is descended from milk producing ancestors. It is always well to inquire as to the dairy breeding of a cow.

Power to Produce Offspring

The profitable dairy cow must be able to produce offspring of her type and breeding. For this reason, too, note the health and constitution. The rear quarters should be roomy.

Final Test

Of course, the final test of any cow is actual performance in the milk pail. The foregoing points are given mainly to assist in estimating the possibilities of a cow. Certainly if a cow is producing abundant milk it matters very little how she is marked. It is always well to know how much milk and its percentage of butter fat that a cow is producing. The Babcock tester is the only method of accurately determining this.

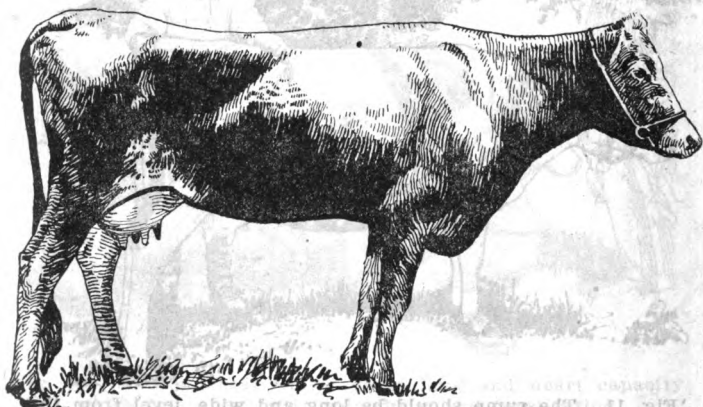


Fig. 12. This cow has a narrow, shallow body. She lacks capacity for feed or digestive machinery. She would be judged as a low producer and unprofitable.

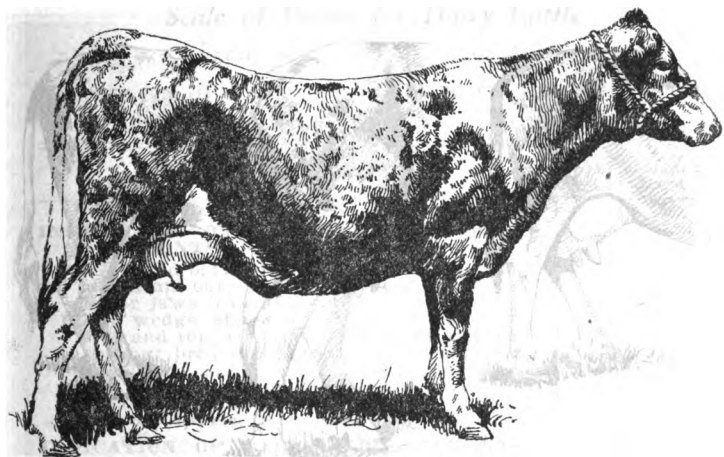


Fig. 13. The back that dips indicates weakness. So does the humped back. A straight, strong back is always desirable.

Common Deficiencies

No cow is perfect, but some defects are more serious than others. See page 57 for a dairy judge score card showing how much more some points count than others.

Some of the most common characteristics of low producing unprofitable cows are:

Long narrow head, small dull eyes, small nostrils and small mouth.

Marked coarseness of bone, hide and hair.

Body short and lacking in depth because of close, short, straight ribs.

Tendency toward beefiness or taking on flesh.

Short, narrow or drooping rump.

Narrowness between the thurls and pin bones.

Thickly fleshed thighs.

Hind legs close together.

Udder deficient in the forequarters, irregular in size of quarters. Teats small and not well placed.

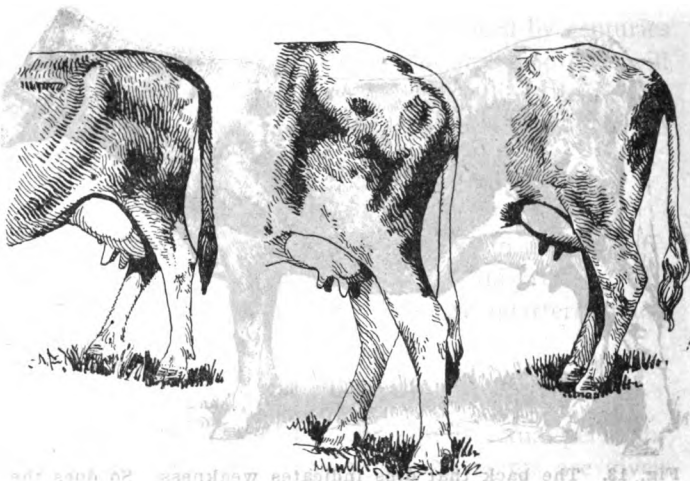


Fig. 14. Three types of bad rumps.

A drooping rump spoils the cow's appearance and usually is accompanied by an udder that is deficient in the forequarters.

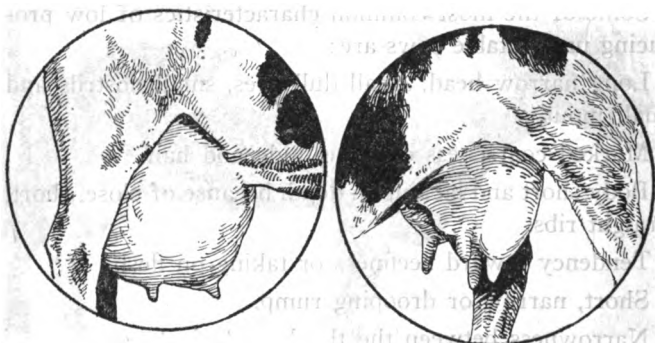


Fig. 15. Types of undesirable udders.

Udders that are irregular or having teats small or badly placed make milking hard and usually reduce milk production.

Scale of Points for Dairy Cattle

From Wisconsin Bulletin 274.

Score one of your cows on this sheet. It will help you in buying.

SCALE OF POINTS		Per- fect	Student's Score
INDICATIONS OF CAPACITY FOR FEED— 25 POINTS.			
Face, broad between the eyes and long; muzzle clean cut; mouth large; lips strong; lower jaws lean and sinewy.....		5	.....
Body, wedge shape as viewed from front, side and top; ribs, long, far apart and well sprung; breast full and wide; flanks deep and full.....		10	.....
Back, straight; chine, broad and open; loin broad and roomy.....		5	.....
Hips and thurls, wide apart and high.....		5	.....
INDICATION OF DAIRY TEMPERAMENT— 25 POINTS.			
Head, clean cut and fine in contour; eyes, prominent, full and bright.....		3	.....
Neck, thin, long, neatly joined to head and shoulders and free from throatiness and dewlap.....		4	.....
Brisket, lean and light.....		2	.....
Shoulders, lean, sloping, nicely laid up to body; points prominent; withers sharp.....		4	.....
Back, strong, prominent to tail, head and open jointed.....		3	.....
Hips, prominent, sharp and level with back.....		3	.....
Thighs, thin and incurving.....		4	.....
Tail, fine and tapering.....		1	.....
Legs, straight; shank fine.....		1	.....
INDICATION OF WELL DEVELOPED MILK ORGANS—25 POINTS.			
Rump, long, wide and level; pelvis roomy.....		3	.....
Thighs, wide apart; twist, high and open.....		3	.....
Udder, large, pliable, extending well forward and high up behind; quarters, full, symmetrical, evenly joined and well held up to body.....		15	.....
Teats, plumb, good size, symmetrical and well placed.....		4	.....
INDICATIONS OF STRONG CIRCULATORY SYSTEM, HEALTH, VIGOR AND MILK FLOW—25 POINTS.			
Eyes, bright and placid.....		2	.....
Nostrils, large and open.....		3	.....
Chest, roomy.....		5	.....
Skin, pliable; hair, fine and straight; secretions, abundant in ear, on body and at end of tail.....		7	.....
Veins, prominent on face and udder; mammary veins, large, long, crooked and branching; milk wells large and numerous.....		7	.....
Escutcheon, wide and extending high up.....		1	.....
Total.....		100	.....

How to Tell The Age of a Cow

It is possible to estimate quite accurately the age of any cattle by looking at the teeth. The mature animal has a total of 32 teeth. There are eight incisors or cutting teeth in the front of the lower jaw and six molars, or cheek teeth, in the back in each the upper and lower jaw. It is from the front teeth that we read the age.

Calf Teeth

A few days after the calf is born two teeth appear in the lower front jaw. Within two weeks there are two more, one on each side of the first pair. By the end of the first month the calf has a full set of eight temporary or milk teeth as shown in Figure 1.



Fig. 1.—Calf Teeth.

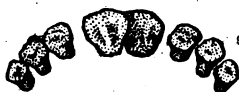


Fig. 2.—At two years of age there are two prominent teeth.



Fig. 3.—At three years of age there are four prominent teeth.

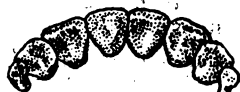


Fig. 4.—At four years of age there are six prominent teeth.



Fig. 5.—At five years of age there are eight prominent teeth.



Fig. 6.—Old age teeth.

18 Months to 2 Years

Between the ages of 18 months and two years the first or center pair of teeth disappear. These are replaced with two prominent incisors by the time the animal is two years old. The appearance of the teeth at this age is shown in Figure 2.

3 to 5 Years

A second pair of incisors, one on either side of the first pair, replace two more calf teeth by the time the animal is three years old. Note Figure 3. At four years a third pair of milk teeth have been replaced (see Figure

4) and the final pair of permanent incisors come in at about four and a half years of age. By the time the animal is five years old it has a full complement of eight incisors as shown in Figure 5.

7 to 16 Years

Then begins the gradual wearing down of these front teeth. Between seven and eight years the central pair become noticeably worn down. By the time the animal is ten years old this leveling process has been extended to the outer or corner teeth. As the teeth wear down they change to a more slanting position. At nine years the middle pair is noticeably reduced in size and at ten years the four central teeth are smaller than the others. The wearing down continues. By the time a cow is 15 or 16 years old she has no teeth excepting small stumps.

Summary

Thus in estimating the age of cattle from the teeth, two prominent teeth in front indicate a two-year-old; four a three-year-old; six a four-year-old, and eight a five-year-old. Some consider six teeth as a sign of a three-year-old and eight as a four-year-old. After six years the age of an animal can only be guessed at.

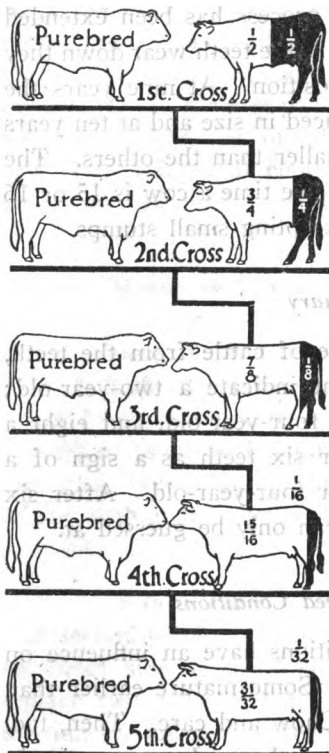
Effect of Feed Conditions

Remember that feed conditions have an influence on the early maturity of cattle. Some mature earlier than others, as a result of better Chow and care. Then, too, some breeds mature earlier than others. Improvements in breeding and feeding have resulted in all cattle reaching an earlier maturity today than they did 50 years ago.

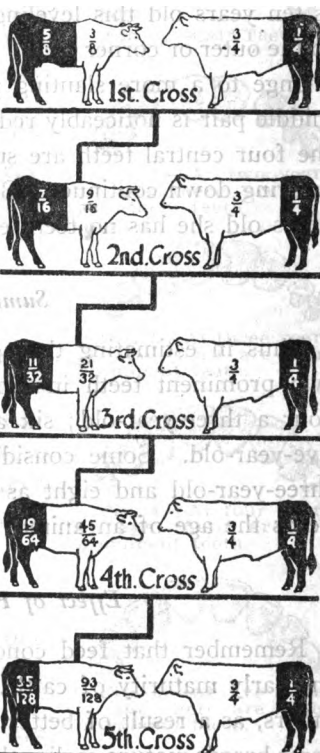
The Dairy Calf

In figuring the profit on the operation of a dairy farm, it is quite common to count only the sale of milk and milk products as the total income. Those who have made the most money in the dairy industry, however, are those who used the best bulls obtainable, and raised their good heifer calves. This gives a supply of heifers each year to replace the lower producing cows of the herd. The

**Progress in five generations
using purebred bulls
and native cows.**



**Progress in five generations
using grade bulls
and native cows.**



Purebred Sires and Herd Improvement

See how rapidly the proportion of native blood (black portion) diminishes when a purebred sire is used.
Courtesy U. S. Dept. of Agriculture.

surplus cows or heifers can be sold at an ever increasing price as the herd improves. Raising calves is a paying operation and is the one way to improve your herd.

Care of the Calf at Birth

It is not enough that a good bull be used—the cows must be kept in such condition that they will bring strong, vigorous calves, and those calves must be given the proper care, beginning right at birth.

It is not often that a cow needs help when the calf is born, but it is well for someone to be near enough to know that everything is going well. A young heifer may trample or hook her calf, and occasionally a cow will refuse to own the calf. As with other young animals a calf is occasionally born with mucus clogging the nose or throat. This can easily be removed with the fingers and prevent the calf smothering, as it might do within just a few moments.

The practice of good dairymen differs on whether the navel cord should be tied with a disinfected string, or left open for free drainage. If the cord is tied one thorough disinfection with five per cent. solution of any of the coal-tar disinfectants or tincture of iodine is enough. If the cord is not tied the cord and navel should be disinfected every day until the umbilicus is sealed. The disinfection of the cord and navel is very necessary, as there are several diseases which can only gain entrance through an open wound. Such infection does not show up for several days or weeks, but when it does appear, it is with difficulty that the calf can be saved. White scours and hemorrhagic septicemia are two of the commonest diseases which must be guarded against in this connection.

The First Milk

The first milk which a cow gives, after a calf is born, is called colostrum. This is not true milk and is considered unfit for human consumption until about the

eleventh milking. The colostrum has a laxative effect which clears the calf's intestines of the matter which has accumulated during the latter part of the period before birth. If, for any reason, the calf does not get the mother's colostrum, castor oil should be given in tablespoonful doses every two hours until the bowels move. Some dairymen give every new-born calf an injection of a quart of warm soapsuds. (See page 63 for method of saving milk in pail feeding.)

Weigh the Calf

Weigh a new-born calf. This information will be a guide to the quantity of feed required. It will also indicate whether calves fully up to average are being brought. The University of Illinois has found the average weight of the several breeds to be as follows:

Breed	Jersey		Guernsey	
Sex	Female	Male	Female	Male
Av. Weight.....	59.7	62.4	68.8	70.0
Breed	Ayrshire		Holstein	
Sex	Female	Male	Female	Male
Av. Weight.....	71.4	77.7	88.0	90.0

When to Separate the Calf and Cow

The practice of separating the calf from the cow at birth or after the colostrum has disappeared, varies among the best dairymen. It is much easier to teach the calf to drink before it has nursed the cow at all, and if fed from a pail from the beginning there is less likelihood of disease picked up from dirt clinging to the cow's teats. On the other hand, a calf nursing a cow will ease any inflammation there may be in her udder much better than can be done by hand. The calf is also certain of receiving its milk at the proper temperature and intervals.

If the calf is allowed to nurse the cow, the teats should be carefully cleaned and the stall in which they are kept given extra care and plenty of bedding.

Teaching the Calf to Drink

This is more a matter of patience than of skill. The accompanying illustration shows a commonly used method. The calf is allowed to suck the fingers while the



head is forced down into the milk. Usually a few lessons of this kind are enough to change his idea of the location of food from *up* to *down*.

Pails in which calves are fed should be thoroughly cleaned and sterilized after each feeding. This will avoid many of the digestive disorders which come from filth.

Pail Feeding

It takes a lot of work to feed milk from the pail for from four to six months. Where whole milk is used its value is often more than that of the calf.

Tests made at various experiment stations and the experience of many successful dairymen show that during the first few weeks much of the milk can be replaced by the right mixture of feed. Large saving in both work and milk can be made after about the sixth or eighth

week when pail feeding can be stopped and given free run to hay and a dry feed mixture. This method will raise calves for beef or dairy purposes which will have just as good quality at maturity as full milk-fed calves.

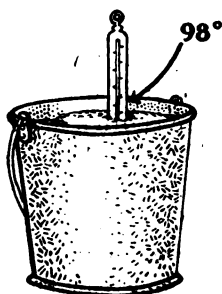
Many mixtures have been tried for replacing milk. By far the best results have come from a simple mixture of a special grade of finely ground blood flour, red dog or wheat flour, finely ground hominy, special linseed flour and 1 per cent. of salt. For success with this mixture each of the ingredients must be of the very highest quality and milled unusually fine so as to go into a gruel readily. This mixture is put out under the name of Purina Calf Chow. During the first few weeks when it is used as a supplement to milk it is extremely easy to use since it need not be cooked or boiled, but merely mixed with the warm milk or water, as described below. After the first few weeks it is fed dry, with no more pail feeding. The results it gives are remarkable.

How Much to Feed a Calf

Authorities agree that no hard and fast rule can be given as to the quantity of feed a calf should have. Only a general guide can be given, which must be varied to suit the requirements of each individual calf.

If a calf has been given a fair start in life by the proper feeding and care of his dam, a careful feeder will experience no difficulty at all in determining the right amount of feed.

The first essentials in successful calf feeding are the use of the thermometer, as feed should always be given at blood temperature (98 to 100 degrees Fahrenheit).



The second rule is the use of the scale or the careful measuring of the feed given. The following table gives the approximate amount of feed required for the average calf. This table must be looked upon as a guide and not as a fixed rule.

Amount of Feed for Calf at One Feeding

Age	Purina Calf Chow	Warm Water
1 to 4 days.....	Mother's milk.	
5 to 7 days.....	1 ounce ..3	pints whole milk....1½ pints
2nd week	2 ounces..2	pints whole milk....2 pints
3rd week	4 ounces..1½	pints whole milk....3 pints
4th week	6 ounces..1	pint whole milk....3½ pints
5th week	8 ounces.....	2½ quarts
6th week	6 ounces.....	2 quarts
7th week	4 ounces.....	1½ quarts
8th week	2 ounces.....	1 quart

These amounts are for each feeding for one calf. Feed twice a day.

Good calves have been raised on Purina Calf Chow with no milk at all after the first four days. We recommend at least the quantity of milk called for in the table above. Where whole milk is available at a reasonable expense, it should be used even more liberally than outlined in the table, for the first month. If good skim milk is available it may well be used in the ration. All the Calf Chow used makes a nice saving over the cost of milk, but the principal value comes in the period when the calf will feed himself with the dry Calf Chow from the trough. The saving in both dollars and time is large.

Dry Feeding

Purina Calf Chow should be placed in a small trough in the calf pen when the calf is about one week old. He will begin to nibble at it some time during the second week,



Unclean milk pails and flies are responsible for many diseases of the calf.

taking larger and larger quantities until at four weeks of age a considerable amount is being consumed. At this age the pail feeding may be cut down one-fourth each week until at eight weeks it is entirely discontinued. From this point on, the Purina Calf Chow taken dry will give excellent results. It should be continued until the calf is at least six months old.

Feed O-Molene With Calf Chow

In addition to the Purina Calf Chow a grain ration should be fed. While the calves are being pail fed, this is best given in the stanchion after the pail feeding. There is no better ration for this purpose than Purina O-Molene, which consists of crushed oats, cracked corn, a small



Rub some dry Calf Chow on the muzzle of the calf if it doesn't take to it readily at the start.

per cent of high-grade alfalfa meal, and cane molasses. If for any reason this is not easily available an excellent temporary ration consists of equal parts of whole oats and corn. Such an amount of grain should be fed as will be cleaned up in thirty minutes. The quantity consumed by individual calves will vary quite a little, as it depends on the state of development of the paunch.

Start Grain Feed Early

Urge the calf to eat grain as soon as possible, for there is less danger from scours where good quantities of grain are taken. In addition, the grain feeding occupies the calf's attention in such a way as to avoid much of the ear sucking and teat sucking. The teat sucking is particularly bad as it is a common cause of badly formed udders and blind quarters. It is quite likely that the habit of a cow sucking herself is formed in this way while a calf.

At about four months of age gradually change the grain ration to Purina Cow Chow, two to three pounds a day.

Hay

There is nothing better than a good quality of clover. The practice varies between allowing calves hay constantly before them and feeding all they will clean up twice a day. Alfalfa hay is used successfully by some dairymen, but must be handled with great care to avoid scouring. This is particularly true if the calf has not been on alfalfa from the very first. We have seen pens of calves so badly scoured by a sudden change from clover to alfalfa hay as to be seriously and permanently injured.

Silage

While some dairymen feed small quantities of silage to young calves with success, it is generally considered better to encourage the eating of more dry roughage by withholding the silage. This develops capacity and serves as further insurance against scours.

Amount of Gain

The average calf should make a normal gain of one to one and one-half pounds a day during the first six months.

Occasional individuals may go as high as two pounds per day average gain.

Water

There is a strange idea among some dairymen that since calves drink a good deal of liquid food, water is not required. This is a sad mistake as good, clean water should always be before calves or offered at least three times per day. A calf's body is more than half water.

Exercise

The calf pen should be light and airy, and in addition opportunity for outdoor exercise should always be given. Calves should be turned out in the cool part of the day during the summer and the warm part of the day during the winter. Success with calves cannot be expected if their quarters are dark and damp or outdoor exercise is not given. Sunshine in the calf pen is essential to success. The calf pen should be thoroughly disinfected in every crack and corner at least once every two weeks. It is only by thorough cleanliness that the various calf diseases can be avoided.

Green Feed

Calves thrive much better if given plenty of green roughage. Some men use night pasturing satisfactorily, but most dairymen feel that the many pasture disadvantages make it worth while to feed green stuff in the calf barn. Hay and grain must be fed in addition to green roughage as a calf's capacity is not large enough to handle enough green feed to make good gains.

Salt

Purina Calf Chow contains one per cent. of salt. Some feeders feel that more is needed. A piece of rock salt where it may be licked at will is convenient in such cases.

Lice

Calves infested with lice do not thrive. Washing the calf thoroughly with a 2 to 5 per cent. coal-tar disinfectant such as creolin or zenoleum is effective. The washing should be repeated in a week in order to kill any lice that hatch in the meantime. If the washing is done in cold weather, the calves should be thoroughly rubbed with dry cloths and kept blanketed until dry. The barn should be thoroughly cleaned and disinfected to stop the spread of this rather serious pest.

Horns

For method of checking the growth of the calf's horns see page 75.

Calf Scours

Every experienced dairyman knows that calves will occasionally scour when they have been given the best of care and attention. At the first indication of this trouble, the feed should be cut down one-half and two to three ounces of castor oil given.

If this treatment has not been given soon enough, the following treatment will be necessary until the scouring stops. Make a mixture of one-half of an ounce of formalin, and one pint of water. Give one teaspoonful of this mixture for each pound of milk or other liquid food at each feeding.

White Scours

A great deal of ordinary calf scours have been called White Scours, but there is a real difference between the two. White scours is a germ disease entering through

the open navel and usually attacks only the very young calf. It is seldom the calf can be saved. This is so serious a disease that upon its first appearance, all pens and utensils having come in contact with the sick calf should be thoroughly cleansed and disinfected.

Pneumonia

This disease is more easily prevented than treated. Plenty of fresh air and sunshine in clean stalls are the precaution. Poor ventilation, drafts, or sudden chilling are the things which make for pneumonia. It sometimes seems to be transmitted from one calf to another. Once a calf has contracted this disease, the best treatments are clean stalls, cold wet compresses on the lungs, enough laxative to keep the bowels well open, and possibly a mustard plaster.

Calf Colic

This difficulty is usually caused by drafts or carelessness in the temperature and amount of feed. Calves frequently die unless given the proper treatment. A mixture of a teaspoonful of turpentine and a tablespoonful of raw linseed-oil is usually given. If one dose does not effect a cure, another should be given in two hours.

Some dairymen keep a mixture of salt one part and charcoal two parts where calves can at all times get to it. It is claimed that this mixture prevents calf colic.

Ringworm

Everyone has seen calves whose heads were covered with ringworm. This is an infection which will run its course and disappear, but can be cured promptly by painting the scabs with tincture of iodine.

Medical Section

The Causes, Symptoms and Cures of the Different Diseases of the Dairy Cow

Contagious Abortion

This is a chronic and widespread disease of cattle involving the organs of reproduction. An abortion may be accidental or it may be due to germ infection. The abortions which are due to the injury of cows during pregnancy are comparatively rare, while those due to contagion are common.

CAUSE. The cause of contagious abortion (that form in which several animals in a herd lose their calves, either by being born too soon or being born dead) is a minute germ which lives in the udder and moves into the generative organs of the female during pregnancy. It may be carried to other cows by the herd bull during service.

SYMPTOMS. Perhaps the first evidence is seen when several animals drop their calves too soon. It may also be noted that some of the animals have failed to "clean" promptly after calving. Following this condition there may be a foul and persistent discharge. Some of the cows may fail to breed and become permanent non-breeders.

TREATMENT. Immediately isolate the aborting cow from the rest of the herd. As soon as possible after the abortion, do not fail to see that the calf, afterbirth and soiled litter are burned or otherwise destroyed. The floor near the animal should be carefully cleaned and disinfected. The remaining treatment must be done by a competent veterinarian. An aborting cow should be clean and free from all discharge before she is returned to the herd. It is a good plan to cleanse the sheath of the bull with a mild antiseptic before and after each service.

Abscesses

An abscess is an accumulation of pus or "matter" usually in or under the skin.

CAUSE. They are always due to germ infection, perhaps following an injury which permits bacteria to enter through the broken skin.

SYMPTOMS. Abscesses are usually warm and very sensitive to pressure. They may be distinguished from other swellings by the fact that abscesses form gradually, while swellings due to bruises, etc., form immediately following the injury. It may be that they are first seen to discharge pus.

TREATMENT. Practically all abscesses should be freely opened with a sharp knife to permit the escape of the pus. Always open from the bottom so that the wound will drain out well. After draining the abscess, cleanse well with an antiseptic solution and leave open.

Bloat

Bloating is a digestive disorder in which there is an abnormal accumulation of gas in the paunch. An excessive amount of any food that ferments and produces a gas is responsible for this trouble. Green forage such as grass, clover and corn if taken in large quantities and especially if covered with dew, is apt to bring on this condition. Bloat is common also when cattle are first turned out and are greedy for an excessive amount of green food after being fed dry concentrates. The forage is eaten too fast and the whole digestive process is thrown out of order.

SYMPTOMS. These are easy to identify. The region on the left side between the point of the hip and the last rib is found to be distended and when tapped with the fingers, one can easily make out the presence of gas. The animal is off feed, uneasy and may be continually getting up and down. The breathing is also faster. Death will follow in severe cases unless prompt relief is given.

TREATMENT. If the bloat is mild, place a rope smeared with tar or wagon grease in the mouth of the animal and tie it back about the horns. This will cause an increased pro-

duction of saliva and the constant champing of the jaws will aid in the expulsion of the gas by mouth as in belching. Administer two ounces of aromatic spirits of ammonia in a quart of water and walk the animal about for 15 or 20 minutes. A few hours later a pound of Glauber's salts should be given to empty the digestive tract. If the distention or bloat is severe and the animal is in great distress, do not administer medicines. The paunch should be punctured with a trocar to relieve the pressure in the stomach. The puncture should be made half-way between the last rib and the point of the hip bone. Leave the trocar in until all the gas has escaped. Unless one is familiar with the use of a trocar, it might be best to secure the aid of a veterinarian. After the gas has been relieved, give about two ounces of turpentine in a pint of raw linseed oil. This will help to prevent further formation of gas.

Blackleg

Blackleg is a very fatal infectious disease of cattle, usually attacking those between the ages of six months and two years. It is most common in the western states and seldom seen in the east.

CAUSE. Blackleg is caused by a germ which usually gains entrance to the body through breaks in the skin (wounds or scratches) or by means of the digestive tract when it is taken in with the food. The germ is very resistant and will live for months in the soil, defying both heat and cold.

SYMPTOMS. The animal is first noted to be lame in either the front or hindquarter. She may be off feed and remain by herself. When the hand is pressed firmly over the affected quarter, air is felt under the skin and emits a crackling sound. When the animal dies and the muscle of the affected leg is cut into, it is found to be black in color and to contain gas. It also has a sweetish odor.

TREATMENT. There is no treatment after the animal becomes sick. Burn or bury the carcass at once. Thoroughly disinfect the ground where the animal died. Remove all the rest of the herd to other pastures, and vaccinate the whole herd at once. This is very effective in preventing the other animals from contracting the disease.

Choke

Choke is understood to mean the lodging of some object in the oesophagus or gullet. It usually happens when the animal attempts to swallow too large a piece of turnip, beet or perhaps an apple. The object is simply too large to pass down the throat.

SYMPTOMS. One nearly always finds coughing, an increased amount of saliva and the inability to swallow water. The animal refuses food and may show evidence of bloating. If the obstruction is high up in the throat it may be grasped with the hand and gradually removed. Do not attempt to force the object down the throat with a broom handle or something equally crude. You are very apt to rupture the gullet if you do. Try to make the animal cough by pinching the windpipe. The effort exerted in coughing will sometimes be sufficient to throw out the choke. If these methods fail, call in experienced aid. An expert may be able to remove the object by means of a probang. This is a long, flexible tube.

Cow Pox

Cow pox is a disease of the skin and is commonly seen in dairy cattle in the form of an eruption or blisters on the udder.

CAUSE. Cow pox is caused by a minute germ and is introduced into a herd by milkers who have been recently vaccinated. The udder becomes infected through the hands of the milker and spreads from cow to cow in this manner.

SYMPTOMS. The first signs are seen on the udder in the form of small blisters or vesicles about the size of a bean. When these are broken, they are found to contain a small quantity of clear fluid. There may be some fever and loss of appetite.

TREATMENT. The disease spreads rapidly and may last for several weeks. It does not cause the death of the animal. Wash off the udder with a mild antiseptic solution and remove the diseased animals from the rest of the herd. Use extra care in milking and wash the hands frequently. A few applications of the antiseptic will be all that is necessary.

Dehorning

The practice of dehorning is becoming increasingly common. It makes the animals easier to handle, gives a more uniform appearance to the herd and increases the safety of the attendants. There are three methods in common use. First the use of caustic on young calves, second dehorning with a saw, and third by means of especially constructed clippers. The last two are used on older animals with fully developed horns. If the operation is done at this time the animals are difficult to confine and the subsequent bleeding is more apt to be serious. The first or caustic method is by far the easiest and most humane.

DEHORNING WITH CAUSTIC. This is simple and easily done. The caustic may be purchased from any drug store in the form of sticks. The operation should be done when the animal is not over a week old. Clip the hair over the region of the head where the horn "button" is located. Grease the area surrounding it with vaseline to prevent the spread of the caustic to the neighboring skin. Wrap the stick of caustic in a paper to avoid burning the fingers. Moisten the stick in water and rub each horn button until it becomes white from the burning. Use extra care to prevent any moisture from running down into the eyes. This treatment destroys the horn and stops its further development.

DEHORNING WITH THE SAW. If the horns are fully developed they may be sawed off. This method is slow, but the saw is not apt to crush the horn as is the clipper. The bleeding is less with the saw. Saw as close to the head as possible, to avoid unsightly stumps.

DEHORNING WITH CLIPPERS. There is an instrument designed for this purpose. It is faster than the saw and the pain is less because it is more quickly over with. However, it sometimes causes crushing of the stumps in old cattle with brittle horns. Clippers give the best results in young cattle. Clip close to the head. Unless this is done the horn may develop again. A good rule to follow is to clip close enough so that a little fringe of hair remains on the cut-off portion of the horn.

AFTER CARE. Do not dehorn in warm weather if it can be avoided. The wounds may become infected or fly blown

and then screw worms will develop. Either of these conditions are troublesome. After the removal of the horns, smear the stumps with either coal or pine tar. If this is done, it will keep off the flies. If after this is done and the stumps do become infested with screw worms they may be destroyed by the use of gasoline. This kills them, after which they can be removed from the horn cavity.

Foot Rot

This is a very common occurrence among cattle which are kept in close, unsanitary conditions or on pastures which are always damp and wet. The disease very likely begins with an injury to the soft parts of the hoof. This later becomes infected and undermines the horny part of the foot. Foot rot is often very hard to control unless strict cleanliness and sanitation are practiced.

TREATMENT. Clean the foot thoroughly with warm water and soap. Cut away all the diseased tissue and soak the foot well in a solution of any good antiseptic. Be careful not to use it too strong. A tablespoonful in a quart of water is strong enough. All the areas where pus is found must be scraped clean. Now apply pine tar with a brush to the foot and bandage carefully around and between the hoof. Over the bandage wrap a clean sack to aid in keeping the foot dry. Bed the cow with clean, dry straw and see that the foot is kept dry also. This is important. Repeat the above treatment every three or four days until healed.

Garget

This is an inflammation of the udder. It is almost always caused by a germ infection. These enter the udder through the teat ducts. The condition called blue, red, yellow, soapy or slimy milk is usually due to some infection of the milk gland. The germs gain entrance to the milk canals from unclean hands and infected afterbirth which drains down and readily contaminates the teats. Many cases are due to the misuse of teat dilators or tubes. As a rule, this instrument does more harm than good. They should never be used without first boiling them carefully.

SYMPTOMS. Heat, redness and swelling of the udder. It may be hard and distended. The milk is decreased in amount

and may have a clotted, yellow or stringy appearance. The infection may be in only one or all four quarters. In severe cases the animal is feverish and off feed. Sometimes she gives the appearance of being lame. This is because the udder is painful and causes discomfort as she walks.

TREATMENT. Separate the cow at once from the rest of the herd. Milk her last or else wash the hands carefully after milking so as to prevent carrying the germ to other cows. Remember that the germ enters through the teat ducts. Administer one-half to one pound of Glauber's or Epsom salts and feed lightly. Apply hot water and massage the udder for at least twenty minutes two or three times a day. Dry and rub in lard. If the udder is very painful make a suspensory bandage and fasten it over the back to relieve the weight. This will lessen the pain. If abscesses should form, call a veterinarian. They will have to be opened and irrigated.

PREVENTION. Just before a cow calves the food should be laxative in nature and the grain ration gradually increased after she has her calf. The udder is more apt to be affected the first few weeks after calving. After calving, wash off the hind parts carefully and the udder especially. Keep it protected from any discharges. Do not milk a cow if the hands are soiled from the previous handling of an infected cow.

Grubs

The infestation of cattle with the bot, ox warble or grub are one and the same disease. The bot or grub is the larva of the warble fly. The fly lays its eggs on the hair about the heels. The animal licks off these eggs and swallows them. After hatching, they find their way to the region under the skin of the back. Here the grub or larva further develops and produces an enlargement or swelling, finally breaking through the skin if they are not squeezed. From this they hatch out into mature flies.

TREATMENT. The grubs may be squeezed out and an anti-septic applied to the opening in the skin. Turpentine may

be rubbed on the skin over the grub when it is in the back, to kill it. After this they should be squeezed out.

PREVENTION. It is practically impossible to prevent the appearance of these grubs. The application of various disinfectants to the backs of cows is of no value. Destroy the grubs, for they develop into the mature warble fly.

Lice

There are two kinds or species of lice which are found on cattle, the biting and the sucking lice. Both are very small but are visible. They multiply rapidly from eggs, or nits, as they are sometimes called. These may be seen on the hair as whitish specks. The blood sucking lice are found on the neck, inner sides of the thighs and withers, where it is difficult for the animal to dislodge them. The biting lice are commonly found on the withers and about the root of the tail but may be found on other parts.

TREATMENT. For hand application, kerosene and lard mixed in the proportion of one-half pint of kerosene to one pound of lard has proven efficient. This may be applied with either a cloth or a brush. If a large number of animals are to be treated, spraying or dipping with any of the common commercial coal tar dips may be advisable. These should be used according to the directions on the manufacturer's label. Any treatment should be repeated in about 16 days. This will allow time for any eggs which might have been on the animal at the time of the first treatment to hatch out. Dusting powders are not usually very satisfactory. Never use pure kerosene alone.

Lumpy Jaw

The technical name for this affection is actinomycosis. It is very common in the middle western and western states.

CAUSE. A fungus is the cause of lumpy jaw. It is usually taken in with the feed.

SYMPTOMS. The first symptom is the slow development of a hard swelling either in the upper or lower jaw, and appears firmly attached to the bone. It is not movable, that is, it is not easily pressed about as an ordinary abscess. The enlargement may grow to be as large as the two fists. It may

become so large as to destroy the teeth on the affected side and interfere with the chewing of food. The tongue is sometimes involved. This condition is called wooden tongue.

TREATMENT. Unless the animal is especially valuable, it will likely be best to fatten and sell for beef. Treatment requires extra skill and should not be attempted by the stockman. The average cow will not pay to treat. An animal with one of these abscesses which is discharging pus should not be allowed with the rest of the herd. The pus contains the fungus which produces the disease and will infect other animals.

Cattle Mange

Mange is a disease of the skin caused by a minute parasite which is scarcely visible to the naked eye. It is sometimes the cause of great annoyance in cattle, but rarely causes death. It spreads rapidly in a herd that is kept indoors, causing general unthriftiness.

SYMPTOMS. The first symptoms are seen about the withers and the base of the tail. The lower parts of the body are affected later. There is an intense itching and the animal scratches and rubs continually. This rubbing causes the loss of hair and the formation of scabs with greyish-white crusts. As a result of the great itching, large sores are frequently found. The parasite may sometimes be detected with a hand lens. The disease is favored by foul stables and close quarters.

TREATMENT. First separate the affected animals from the healthy ones. Clip the hair and wash thoroughly with warm water and soap to remove the scabs. An ointment made of one part of flowers of sulphur and four parts of lard has given good results. After about three days this should be washed off as before and the treatment repeated. Thoroughly cleanse the stables and disinfect.

Milk Fever

The technical name for this disease is parturient paresis. It is a non-contagious disease of cows and almost always occurs after calving.

CAUSE. The exact cause of milk fever is not known, although there are numerous theories. It is known, however,

that it occurs after calving in cows that are heavy feeders and high producers. The cause is thought to be due to auto-intoxication, or poisoning from overfeeding and lack of exercise before calving.

SYMPTOMS. Uneasiness and a falling off of the milk flow. The animal goes down suddenly and appears paralyzed. At first she may be found upon her side with her head in the right flank. Soon after this she stretches out on her side with the head extended in an unconscious condition. The breathing is slow and labored. There is no rise in temperature.

TREATMENT. There is only one successful treatment for this disease. Most stockmen are familiar with it. This is the blowing up of the udder with air. There is an especially designed apparatus which is easily secured or a common bicycle pump may be used in an emergency. Do not fail to sterilize all the instruments used, by boiling. Wash the udder and teats and apply a mild antiseptic. Blow up each quarter and tie up each teat with tape to keep the air from escaping. In most instances this procedure will restore the animal to consciousness in a short time. When the animal is back on its feet, remove the tape from the teats. The after care consists in a light laxative diet.

Tuberculosis

Tuberculosis is a contagious disease of man and nearly all animals. It is the most widespread of all animal scourges and is found in all parts of the country. The annual loss from this disease is overwhelming.

CAUSE. Tuberculosis is caused by a germ very similar to the one which affects man. These germs are usually inhaled or are taken in with the food. Inasmuch as the lungs are commonly affected the germs are expelled in enormous numbers during the act of coughing. Thus one coughing animal can easily infect the other animals in the same herd. When the udder is affected, large numbers of the germs are passed out through the milk and become a source of great danger to the consumer, especially little children.

SYMPTOMS. Some animals become thin and run down with a rough hair coat and scraggy appearance. The majority

appear in the best of physical condition until the disease is far advanced. If the lungs should be affected, the animal may cough and show signs of distress in breathing. If the disease is suspected, have the herd tested. It might be well to have the test made anyway to be sure the herd is free from this awful plague.

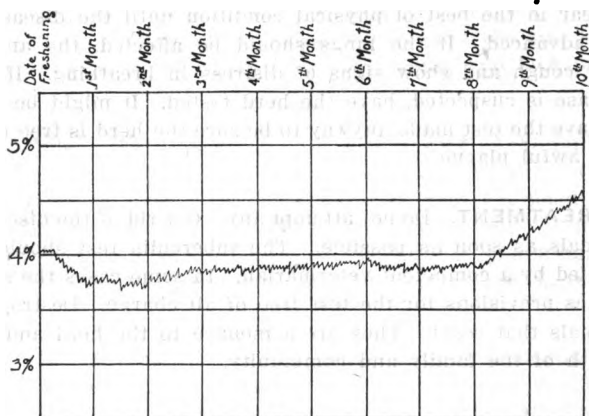
TREATMENT. Do not attempt any. Get rid of the diseased animals as soon as possible. The tuberculin test should be applied by a competent veterinarian. In some cases the state makes provisions for the test free of all charge. Destroy all animals that react. They are a menace to the herd and the health of the family and community.

Retained Afterbirth

This condition is rather common in cows and is sometimes associated with contagious abortion as one of the symptoms. The symptoms are simply the failure of the afterbirth to pass out following the birth of the calf. If the afterbirth fails to be expelled after 48 to 72 hours, the services of a veterinarian should be sought. Do not attempt its removal, for this frequently results in the tearing of the genital organs and infection is almost sure to follow. Some dairymen attempt this operation themselves with success, but most always is it the reverse. Burn or bury the afterbirth. Thoroughly clean and disinfect the gutter behind the animal and keep her isolated from the rest of the herd for a few days to make sure there is no discharge.

Rupture or Hernia

This condition is somewhat frequent, and when it occurs in older animals as a result of horning by another cow, or a kick, there is little that can be done. However, the rupture of the navel which is common in young calves as a result of the failure of the muscles to close about the umbilical cord, is more easily handled. Treatment is not always necessary. If the hernia is small it may close up of itself. It might be well to apply a bandage about the abdomen of the new-born calf which is affected in this way. Most of the umbilical ruptures in new-born calves will right themselves if left alone.



The Effect of Feed on the Richness of Milk

Some feed gives milk a rich, yellow color. This has led to a great deal of confusion about the effect of different feeds on the butter fat test or the quantity of cream in the milk which a cow produces. The fact is that each individual cow makes milk of a certain quality. In general, Jerseys and Guernseys give higher test milk than Holsteins and Ayrshires. There is no possible way of feeding a Holstein cow which naturally gives about 4 per cent. milk so that she will give the 5½ per cent. butter fat milk which many Jerseys give. A sudden change of feed, such as turning on pasture, will temporarily change the butter fat test, but after a very short time it will come right back to the natural average of the particular cow.

A cow's milk varies from day to day in richness. There is a general average, however, which all cows show throughout the lactation period. For the first eleven or twelve weeks after freshening the average test falls off slightly, then begins to rise slowly to the eighth month, after which it takes quite a rapid rise until the cow is dry.

The result of a number of tests on this point is shown in the chart on the preceding page. This, of course, shows the per cent. of butter fat in the milk and not the total butter fat produced.

The changes in the per cent. of cheese making material in milk follows very closely changes in the percentages of butter fat.

Care of Milk and Cream

The chief factors required for the milk to reach the consumer and factory in proper condition are cleanliness and low temperature.

Wipe off the udder with a clean damp cloth before milking. Milk into a clean pail with clean dry hands. Strain the milk as soon as drawn in a clean room free from dust and foul odors. Use a wire mesh strainer (60 to 80 mesh to the inch) instead of a cheese cloth strainer, as the latter is hard to cleanse and is never really clean.

Cool the milk to as low a temperature as the available water on the farm permits. Use ice, if available. Cooling to 60 degrees F. is better than no cooling at all, but lower temperatures are preferable. Keep the milk cold until it leaves the farm.

The simplest way to cool the milk is to set the can in a box, trough, tub or half barrel of water and stir the milk to hasten the cooling. If running water is available let it run through the trough continuously; if not, change the water at least once before retiring for the night.

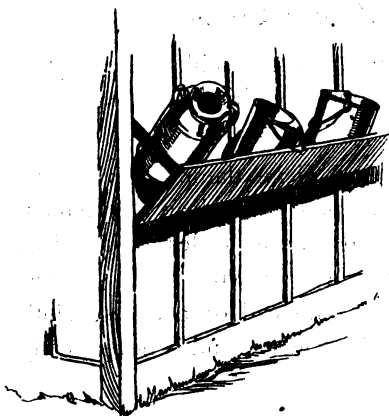
If the milk is separated, cool the cream immediately after separation and keep it cool until it leaves the farm.

When hauling milk and cream to the factory or station cover the cans with a wet blanket to protect them from

the sun. If left at the station before train time set the cans in cold water or in the shade at the station.—Purdue University Department of Agriculture Extension Leaflet No. 32, pp. 2 and 3.

How to Cleanse Dairy Utensils

Rinse all dippers, pails, strainer, cans, etc., with cold water. Wash them thoroughly with hot water to which



some washing powder has been added, scrub with a brush until all remnants of milk are removed. Then rinse the utensils thoroughly with scalding hot water. Do not wipe them off with a cloth, they do not need it, but incline them on a clean shelf or over pegs so that the water can drain off readily. If the

utensils are allowed to drain out-of-doors, the shelves or rack should be at least four feet above ground to prevent undue contamination from dust.

Cleaning the Separator

Flush the separator with plenty of cold water immediately after use. Take the bowl apart and wash with warm water and washing powder all parts until they are thoroughly clean. Then rinse them thoroughly with scalding hot water and place them in the clean milk supply tank to drain.

A pound of Calf Chow and seven pounds of warm water make a gallon of Calf Chow milk at a saving of two-thirds the cost of ordinary milk.

Do Not Mix Warm Milk or Cream With Cold Milk or Cream

Never mix warm morning's milk or cream with the cold milk or cream of the previous evening. Such a mixture sours quickly. If the two must be mixed, cool the warm milk or cream before mixing, otherwise haul or ship to the factory in the separate cans.

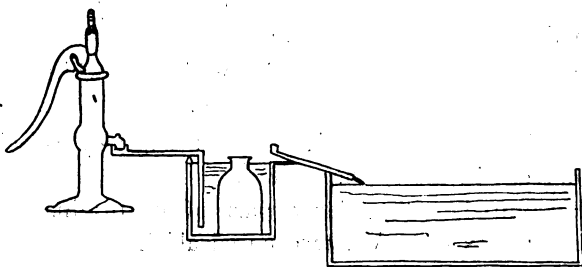
It Pays to Take the Proper Care of Milk and Cream on the Farm

Your attention to these details cost you nothing outside of a little thought and time to which the consumer and the factory are justly entitled. It will save you much annoyance and financial loss caused by rejected and returned milk and cream and it insures you the price paid for a first-grade product.

The Care of Cream

The two things most important in producing good cream are cleanliness and quick cooling.

The separator must be washed thoroughly after each separation and the cans, pails and other utensils must be kept clean.



The cream may be cooled quickly and easily by an arrangement such as shown on the diagram. Simply place a small cream cooling tank, or even a barrel, between the

pump and the stock tank and connect in such a manner that the water from the pump enters the cream-cooling tank from the bottom and overflows from the top into the stock tank, as illustrated by the drawing. In this manner all water for the stock is first used for cooling cream, thereby saving unnecessary pumping and insuring plenty of cold well water for cooling the cream.

A cover on the cream-cooling tank will help to keep the cream sweet, and if the tank is provided with insulation that will keep the water from changing temperature, so much the better.

By proper arrangement, according to the ingenuity and means for the farmer, this method of quick cooling and good care of the cream may be provided without much trouble and expense, and the well becomes as useful as a natural spring and the work of cooling and caring for the cream very convenient.—Missouri Dairy Commissioner's Bulletin, pp. 81 to 85.

Yellow Color in Cream and Butter

Missouri Experiment Station, Circular No. 74, April, 1915

Carotin (or yellow) pigment in green feed produces similar color in cream and butter.

Cream and butter from the Jersey cow had a higher color than the other breed, when fed feed high in carotin.

All the breeds were alike in producing white cream and butter on the Carotin-poor ration.

Carotin-Rich Feeds.—Green pasture grass, especially when fresh in the spring or fall.

Hay, cured, with a large part of its original green color, such as most Western cured alfalfa hay.

All soiling crops.

Green corn fodder.

Very new corn silage.

Carrots and other yellow roots and tubers.

Carotin-Poor Feeds.—All hay that has lost its green color in curing, such as timothy and clover.

Dry corn fodder (corn stover).

All corn silage, except when very new.

Straw, all kinds.

Corn, both yellow and white.

Wheat.

All so-called by-products, such as wheat bran, brewers' grains, cottonseed meal, linseed meal, etc.

A great deal of the gluten feed on the market has been artificially colored with a yellow vegetable coloring matter. It has not been ascertained whether this coloring matter will pass into the milk fat.

Natural gluten feed may be classed with the carotin-poor feeds.

1. No breed of dairy cows is able to manufacture the coloring matter for its cream and butter; the primary source must be the carotin in the feed. All breeds were found to be alike in producing white cream and butter on carotin-poor rations.

2. The whole question of breed difference is merely a relative one. The so-called low color producing breeds can give reasonably well colored products when fed plenty of carotin-rich feeds, but not as high colored products as the Guernsey and Jersey breeds under the same condition. The data collected on this point has led to the opinion being advanced that the breed difference in respect to color production has been over-emphasized.

3. No breed difference in color of the products exists immediately after parturition. The colostrum milk of all cows is very highly colored, due to a relatively very large amount of carotin in the milk fat.

4. The whole question of the breed difference rests entirely on the fact that for some still unexplained rea-

son, some breeds of cows make use of more carotin than other breeds when making their milk.

Jersey and Guernsey cows carry yellow fat in body and against skin, which is the same as butter pigment. They draw on this reserve supply when feed is low in carotin.

Odor in Milk

Milk absorbs odors very quickly. Unclean milking quarters, old bedding, musty silage and hastily cleaned pans and buckets will all affect milk drawn or standing near them.

If cows eat certain weeds, such as wild onions, it will also affect the milk. Where your pasture has such weeds, it is best to take the cows off pasture at least two hours before milking. This will practically eliminate the odor and taste.

If at all possible, the part of the pasture containing these weeds should be fenced off and the cows can be grazed on it immediately after milking and moved to another pasture later.

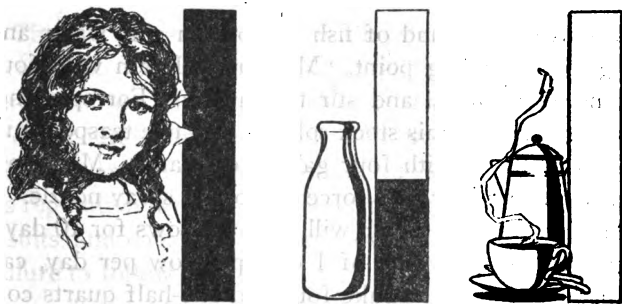
How to Stop a Self-Sucking Cow

One of the simplest and surest methods of breaking a cow of sucking herself is to put an old work bridle on her. The bit of the bridle should be divided in the middle.

This will stop the confirmed sucker. The bit will bother her for a day or two, but she will soon get used to it. This method does not interfere with the cow moving around as she desires.

Bran, middlings, cottonseed meal and other by-products are made accidentally in the production of something else. Cow Chow is made with one idea in mind—a fuller milk pail.

Milk as Compared with Tea or Coffee as Food



The solid black line represents the growing material needed daily by an eight-year-old girl.

The next picture shows that if she drinks a quart of milk daily she will get nearly half of her total food requirements, leaving the rest to be made up by other foods.

The next picture shows that if she drinks tea or coffee she gets no food value at all and has to make up her entire food requirements from some other source.

This is only one of the many interesting facts brought out in the booklet mentioned below.

Give the Children Plenty of Milk and Watch Them Grow

Milk is the best food for growing children. It contains all the food material needed for growing bones and muscles. Every child should have at least two big cups of milk a day. Milk combined with bread, cereals and vegetables should be the main part of the diet of boys and girls.

Tea and coffee take away the appetite for the things which make children grow. Tea and coffee may satisfy the longing for food, but they do not provide any of the things which the body must have in order that it may grow strong and healthy.

(If milk and sugar are used in the tea or coffee, some food value would be received, but the coffee and tea are not good for growing muscles and nerves.)

"The above material taken from the booklet, 'What Milk Will Do for Your Child,' published by the National Dairy Council, 910 South Michigan Avenue, Chicago, Ill. Additional copies of this book will be supplied by them at 25 cents each."

Anti-Fly Sprays

Dissolve one pound of fish oil soap in soft water and bring to the boiling point. Mix this solution with four gallons of crude oil and stir thoroughly. For spraying, mix one gallon of this stock solution and five teaspoonfuls of Black-leaf 40 with four gallons of water. Mix thoroughly and apply with a force pump and spray nozzle.

Another mixture which will spray 40 cows for 10 days, twice per day at a cost of 1 cent per cow per day, can be made as follows: Take four and one-half quarts coal tar dip, four and one-half quarts fish oil, three quarts coal oil, three quarts of whale oil, one and one-half quarts oil of tar. Mix these together and add three pounds of dissolved laundry soap and add the whole mixture to 30 gallons of lukewarm water. Mix thoroughly.—*The Dairy Farmer*.

Tear Off Here

RALSTON PURINA COMPANY,
ST. LOUIS, MO.

I am milking.....cows. Would like to try two bags of
Cow Chow to each. Am raising.....calves. Send me
.....pounds of Purina Calf Chow.

Send this through a nearby dealer or direct from your nearest mill.

Name

P. O. Address: Town.....State.....

Shipping Point: Town.....State.....

Banker

Follow These Feeding Directions

There is no use buying Cow Chow if you do not follow directions. These feeding directions are the result of careful observation in hundreds of barns, and are practical, accurate and profitable. If you do not want to follow them, we would rather you did not buy Cow Chow. Its reputation is too valuable to us to have anyone get poor results, and poor results from Cow Chow come only from failure to follow directions.

Start Cow Chow Slowly

Any sudden change in a cow's feed may upset her milk flow for a few days. Pay no attention to the results during the week that Cow Chow is being introduced. Cow Chow is made to give you the best results the year 'round, and after you have had each cow on Cow Chow a month, you will see what a real milk producer it is.

At Least Two Bags to the Cow

Two bags of Cow Chow will feed a cow about one month. With a smaller amount, a cow hardly gets on her stride after the change. Don't start with less than two bags to each cow.

Cow Chow Is Safe

Cows on test have sometimes eaten as high as 30 to 40 pounds of Cow Chow a day without bad results. This is not recommended except under the most careful supervision, but if your cow is getting plenty of roughage, she will eat a surprising amount of Cow Chow and increase the milk as you increase the feed. Fifteen or 20 pounds a day for a heavy milker is perfectly safe. Watch the droppings to see that she is not constipated or too loose.

How to Feed Cow Chow

Feed enough roughage. Then replace a quart of your old feed with a quart of Cow Chow morning and evening. After doing this two days, feed two quarts of Cow Chow, morning and evening, in place of two quarts of your former ration. After six days feed three quarts of Cow Chow, morning and evening, in place of the same amount of the former feed. After the eighth day feed Cow Chow according to the following directions:

With Mixed Hay (Clover and Timothy), Timothy Hay, Johnson Grass and Prairie Hay With or Without Ensilage

Feed plenty of roughage. For Holstein or Ayrshire cows, feed a pound of Cow Chow to $3\frac{1}{2}$ pounds of milk. For Jersey or Guernsey cows, feed a pound of Cow Chow to every 3 pounds of milk. If the roughage is short or the cow is near the end of her lactation period, add an extra quart of Cow Chow at a feeding.

For Clover, Alfalfa, Soy Bean or Cow Pea Hay With Ensilage

Feed plenty of roughage. Mix one part of corn, corn and cob meal, oats, barley or middlings to three parts of Cow Chow, and then feed a pound of this mixture to $3\frac{1}{2}$ pounds of Holstein or Ayrshire milk, or 3 pounds of Jersey milk. If the roughage is short or the cow is near the end of her lactation period, add an extra quart of Cow Chow at a feeding.

For Clover, Alfalfa, Soy Bean, or Cow Pea Hay Without Ensilage

Make a half and half mixture of corn, corn and cob meal, barley, oats or middlings—and Purina Cow Chow. Feed one pound of this mixture to $3\frac{1}{2}$ pounds of Holstein

or Ayrshire milk, or one pound of this mixture to 3 pounds of Jersey milk. If the roughage is short or the cow is near the end of her lactation period, add an extra quart of Cow Chow at a feeding.

On Pasture

When cows are first put on green pasture, they usually put more food material into the milk pail than they actually take into their systems. This shows up later on in decreased production. Feed half a gallon of Cow Chow night and morning to your good milkers from the time they start on pasture. When pasture dries up, feed Cow Chow the same as in winter.

For dry cows see page 35.

For calves see page 65.

To Stop Cow Bolting Feed



If a cow has a tendency to bolt her feed and then when she gets through eating is nervous and doesn't want to stand still, put a few large, smooth rocks in her box or manger. She will have to get the feed out from between them and it will take her several times as long to eat, giving you plenty of time to milk while she is occupied.

Call on Dairy Chow Department

If you have any problem in connection with the feeding of your dairy cows or calves and one which these feeding directions do not answer, write Dairy Chow Department, Purina Mills, St. Louis. This department will be glad to be of service to you and answer any questions.

General Suggestions

Shelter

Before a cow can use feed for any other purpose, she must keep her body at normal temperature. It's cheaper to keep her warm with good shelter than to let her get cold from exposure and then have to warm her with feed. Don't let your cows stay in an open pasture on cold nights.

Air

Barns should be free from drafts, but should be built to maintain a continuous outgo of foul air and intake of pure, clean air.

Water

A cow's body is over half water. Milk is seven-eighths water. The more water your cow drinks the more milk she will give. Remember that a cow doesn't always want to drink water just at the time she may have it offered to her. Keep water before her all the time—cool, fresh water in summer and warm, fresh water in winter.

Feed Enough

About two-thirds of a cow's feed goes to maintain her body. It is the last third that goes into the milk pail. The more milk-making material, the more milk. Feed enough.

Roughage

About two-thirds of a cow's feed should be roughage, such as hay, ensilage, grass, roots (beets, carrots, turnips, etc.), fodder and similar feeds. When a cow is not given all of the roughage she can possibly hold, she does not get enough to maintain her body. She then has to draw on the higher priced grain feed to make up the difference, and naturally gives less milk per pound of grain.

Don't be satisfied to give the cow all the roughage she wants—give her all you can get her to eat by skillful feeding. A cow should have 2 pounds of hay a day to every hundred pounds of live weight. With ensilage, feed 1 pound of hay and $3\frac{1}{2}$ pounds of ensilage a day, to every hundred pounds of live weight. See page 33.

You Buy by Weight—Feed by Weight

It is most convenient to use a gallon measure when feeding. But you buy your feed by the pound and should always calculate the amount given each cow, by the pound. A gallon of Cow Chow weighs $3\frac{1}{2}$ pounds. A quart of Cow Chow weighs nine-tenths of a pound. Milk weighs about $8\frac{1}{3}$ pounds to the gallon, or "A pint's a pound the world around."

Pay Each Cow According to Her Work

One hundred pounds of feed, carefully apportioned, will often make as much milk as 150 pounds divided evenly. Don't feed each cow the same. Study each cow. Feed her as an individual. She will pay for it.

Treatment

Milk making is a nervous function. A cow's nerves must be quiet to make the most milk. Kind treatment and careful handling pay big results in the pail. The man who milks a cow with a pitch-fork usually says, "Cows don't pay" and they won't pay a hard master.

Keep Records

Milk record sheets, each containing space for the complete monthly record of four cows, will be sent free on application to the Dairy Chow Department, Ralston Purina Co., St. Louis, Mo. Know what your cows are doing. Give every cow a chance, with good feed and good care. If she doesn't pay then, replace her with a better one. See page 45.

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Guaranteed Analysis

Cow Chow		Calf Chow	
Crude	Digestible		
24.0%	20.5%	Protein	27.0%
4.3%	4.0%	Fat	3.2%
42.0%		Nitro-Free Ex.	50.0%
53.0%	45.0%	Carbohydrates	55.0%
12.0%		Fiber	4.5%

INGREDIENTS

Cow Chow	Calf Chow
Linseed oil meal (old process)	Blood flour
Gluten feed from corn	Linseed meal
Hominy feed	Hominy feed
Cottonseed meal	Wheat flour
Ground alfalfa	Corn meal
Molasses	1 per cent salt
1 per cent salt	



Give the Boy a Heifer

*Give the boy a heifer,
 Start him on his way.
 Make him feel he's starting in,
 To be a man today.
 Let him know the value
 Of a cow or two.
 See him take a keener pride
 In the farm for you.*

*Give the boy a heifer,
 Tell him—"Take it, son,
 May you have a dozen cows,
 Soon, instead of one."
 Let him know he's wanted
 On the old farm, too,
 And he'll stay and work his way
 Side by side with you.*

—Selected.

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